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IN THE

Supreme Court of the United States

OCTOBER TERM, 1984

CHAS. S. TANNER CO. and
NATIONAL STARCH AND CHEMICAL
CORPORATION,

Petitioners,

v.

AIR PRODUCTS AND CHEMICALS, INC.,

Respondent.

ON WRIT OF CERTIORARI TO
THE UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

APPENDIX TO
PETITION FOR CERTIORARI

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Court of Appeals Decision, Filed June 29, 1984

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CURCUIT

AIR PRODUCTS AND CHEMICALS, INC.,
Appellee,

v.

Appeal No. 83-1230

CHAS. S. TANNER CO. and NATIONAL STARCH & CHEMICAL CORP.,
Appellants.

DECIDED: June 29, 1984

Before FRIEDMAN, *Circuit Judge,* COWEN, *Senior Circuit Judge,* and SMITH, *Circuit Judge.*

SMITH, *Circuit Judge.*

DECISION

The judgment of the United States District Court for the District of South Carolina, 219 USPQ 223, holding that the Lindemann patent No. 3,708,388 (the '388 patent), assigned to appellee Air Products and Chemicals, Inc. (Air Products), is not invalid, is enforceable, and is infringed by the products of appellants Chas. S. Tanner Co. and National Starch and Chemical Corp. (National), is *affirmed.*

OPINION

1. Obviousness

National stresses that the trial court, in differentiating between the prior art and the claimed invention, failed to realize that the '388 patent in fact claims, or does not prohibit, the use of surfactants in promoting the dispersion of vinyl acetate and ethylene in water to produce the claimed adhesive

composition. National points both to example 1 of the '388 patent, which discloses the use of surfactants, and to the language of claim 1 which does not on its face exclude surfactants, as evidence of the trial court's error in allegedly finding what National terms a "no surfactant" limitation in the '388 patent.

The '388 patent, however, claims only the type of composition disclosed in example 8. 219 USPQ at 227. Expert testimony established that the process claimed in claim 1 results in the unique product described in example 8; that example corresponds to Air Products' and its licensee's manufactured adhesives as well as to National's allegedly infringing products. 219 USPQ at 227, 229, 245-48. Our review of the record indicates no clear error in the district court's finding that the '388 patent claims only the type of composition exemplified by example 8, and we so limit our analysis.

National's second point that claim 1 does not expressly exclude surfactants is correct on its face. However, claim 1 is limited to "[a]n adhesive composition consisting essentially of an aqueous vinyl acetate-ethylene copolymer emulsion * * * copolymerized in the presence of a protective colloid * * * consisting essentially of a polyvinyl alcohol and hydroxyethyl cellulose." 219 USPQ at 230. As the trial court noted, the "consisting essentially of" language limits the use of additional ingredients to those which would not change the invention's basic character. 219 USPQ at 230. Hence any surfactants employed in the claimed composition would be limited to those used in amounts which would not alter the invention's basic characteristics. 219 USPQ at 234.

National's specific contentions that the trial court failed to appreciate the significance of the prior art focuses on four references. Regarding three of these—the Air Products '990 patent, the French '382 patent, and the German '085 patent —National emphasizes that the district court failed in distinguishing these from the claimed composition because of what National terms the erroneous "no surfactant" limitation. The lower court did carefully differentiate each of these refer-

ences from the claimed product, however, as regards both the necessity for "copolymerization in the presence of a protective colloid" and the degree to which surfactants were used.

For example, the '990 patent, while disclosing that a protective colloid can be used, teaches as well that the colloid should be kept "at the lowest level possible" and that several surfactants should be used. 219 USPQ at 238. A similar problem exists with the German '085 patent, which teaches the use of a protective colloid as a sort of afterthought to the use of surfactants. 219 USPQ at 235-36. Likewise, the French '382 patent teaches a process using a mixture of surfactants and protective colloids such that the level of surfactants would exceed the "consisting essentially of" limitation in the '388 patent. 219 USPQ at 234. Regarding the fourth reference, Daratak B, National's argument that the claimed adhesive constitutes nothing more than the obvious substitution of ethylene for dibutyl maleate into Daratak B, founders on well-known law: the "obvious to try" test is not appropriate under 35 U.S.C. § 103 (1982). 219 USPQ at 239.

Finally, National claims clear error as regards the lower court's findings on secondary considerations pertaining to obviousness. The record is particularly strong, however, regarding the invention's immediate and surprising commercial success, due to its unexpected adhesive and cohesive properties. 219 USPQ at 240.

In sum, we find no clear error in the district court's factual findings regarding obviousness and accordingly hold that the district court correctly held the patent not to be invalid.

2. Unenforceability

National contends that the court below erroneously styled as fraud what was National's inequitable conduct claim. Regardless of which way the issue was analyzed, however, National must at least have established that the prior art allegedly withheld from the patent office was material. *Orthopedic Equipment Co.* v. *All Orthopedic Appliances,* 707

F.2d 1376, 1383, 217 USPQ 1281, 1286 (Fed. Cir. 1983). We see insufficient evidence of materiality to find clear error on this point. The French and German patents were merely cumulative to the prior art, especially in view of the substantial progress made by Lindemann as reflected in the '851 patent, which was before the examiner. 219 USPQ at 242. Similarly, although the court below did not discuss in detail why Daratak B was not material prior art, the record and the court's analysis show that Daratak B employed the comonomer dibutyl maleate instead of ethylene with the vinyl acetate and that the copolymerization was carried out at atmospheric rather than elevated pressure. In addition, Daratak B was poor in cohesive strength and creep resistance. 219 USPQ at 232, 239-40. In sum, we hold that the trial court did not commit clear error in finding the patent enforceable.

3. Infringement

National's primary contention against infringement is that its products are terpolymers, *i.e.*, compositions containing third monomers, added to improve adhesive properties, in addition to the monomers vinyl acetate and ethylene—such that its products are lifted outside the "consisting essentially of" language of the '388 patent, claim 1. The record established, however, that these third monomers (acrylamide and others), which were added in very small concentrations, were not such as to change the basic and novel adhesive characteristics of the claimed invention, for which National's products directly substituted. 219 USPQ 249-50, 245-48. National's advertising and advice to customers did not tout the presence of the third monomers, and in fact the addition of the acrylamide caused manufacturing problems, so that it was replaced by another third monomer. Having reviewed the record, we find no clear error in the trial court's finding that National's products infringed Air Products' composition, both directly and under the doctrine of equivalents.

4. Exceptional Case

As an initial matter, National contends that it was "surprised" by the "exceptional case" issue because the trial court did not permit the exchange of pretrial briefs. Later the trial court excluded opinions of counsel from the record which National belatedly offered in its defense on this issue. To the extent National is raising a due process violation before this court, we reject the contention, as the trial court required the parties to exchange extensive information before trial and entered a pretrial "stipulated order" delineating the issues in reference to the pleadings. Moreover, National's trial counsel did not raise the exchange-of-pretrial-briefs issue until after trial, and then only informally. While the trial court's practice concerning pretrial briefs may not be the better one in this situation, it does not constitute grounds for either denial of due process or harmful error. *Cf. Photovest Corp.* v. *Fotomat Corp.*, 606 F.2d 704, 708-11 (7th Cir. 1979), *cert. denied*, 445 U.S. 917 (1980). In any event, the district court did admit and analyze the Wacker-Chemie opinions, the DuPont opinion, and National's 1973 opinion, and allowed unrebutted testimony concerning the 1973 opinion. 219 USPQ at 241. Its exclusion of additional opinions belatedly offered by National cannot be considered error, and certainly not harmful error.

National attacks the lower court's finding that this is an "exceptional case" under 35 U.S.C. § 285, such that National must pay Air Products' reasonable attorney fees. This court will not overrule the district court's finding on this issue unless we see an abuse of discretion. *Orthopedic Equipment Co.*, 707 F.2d at 1384, 217 USPQ at 1287. National has failed to show such abuse. For example, National's addition of third monomers to its products constituted important evidence that National was acting to avoid the '388 patent, especially since these additional monomers added nothing to the nature of the product and in fact caused process problems, as mentioned above. Additional evidence was National's hiring one of the inventors, Lindemann, who instructed his chemist to copy example 8. The

probity of the most important opinion of counsel in evidence, National's 1973 opinion concluding that the '388 patent was invalid, is undermined by National's subsequent actions. It negotiated with Air Products for a license and declined to manufacture the claimed composition until 1980, when National acquired Tanner, which had been manufacturing infringing products. Considering all of this in the record below, we find no abuse of discretion in the trial court's finding that this is an "exceptional case," and affirm the lower court's holding in this regard.

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF SOUTH CAROLINA
GREENVILLE DIVISION

AIR PRODUCTS AND CHEMICALS, INC.,
Plaintiff,

v. **CIVIL ACTION NO. 79-826**

CHAS. S. TANNER CO. and NATIONAL STARCH AND CHEMICAL CORP.,
Defendants.

ORDER AND OPINION, INCLUDING FINDINGS OF FACT AND CONCLUSIONS OF LAW

I. INTRODUCTION

This is an action for patent infringement and misappropriation of trade secrets. The plaintiff brought the patent infringement action on May 2, 1979. On July 11, 1980, plaintiff moved to amend the complaint to assert trade secret misappropriation. After briefing and argument, the motion was granted on February 24, 1981 and the amended complaint was filed on that same day. Thirty days later, defendants filed their amended answer denying infringement of the patent, challenging its validity, and denying any misappropriation of trade secrets. In addition, defendants filed counterclaims contending that the plaintiff had violated the antitrust laws. On December 21, 1981, the Court ordered a separate trial on the issues of patent validity, patent infringement and the existence and misappropriation of trade secrets. All other issues were severed for separate trial. The trial on the patent and trade secret issues commenced on November 29, 1982 and was completed on December 15, 1982.

This order and opinion constitutes the Court's findings of fact and conclusions of law on those issues pursuant to Rule

52(a), Fed.R.Civ.P. The Court has considered the numerous issues raised by both plaintiff and defendants in this action. That some issues or arguments are not specifically mentioned or addressed in this opinion indicates only that, after due consideration, the Court found the issues or arguments to be without merit or of no consequence to the outcome of the case. For the reasons discussed herein, this Court finds for the plaintiff on the patent issues and for the defendants on the trade secret issues.

II. THE PARTIES

The plaintiff in this action is Air Products and Chemicals, Inc. (hereinafter "Air Products"), a corporation organized and existing under the laws of the State of Delaware, having its principal place of business in Allentown, Pennsylvania.

The present defendants include National Starch and Chemical Corporation (hereinafter "National Starch"), a corporation organized and existing under the laws of the State of Delaware, having its principal place of business in Bridgewater, New Jersey. The original defendant in the case was Chas. S. Tanner Co. (hereinafter "CST"), a wholly-owned subsidiary of Ciba-Geigy Corporation. CST was a Delaware corporation with a regular and established place of business in the District of South Carolina. On or about July 31, 1980, National Starch purchased all the capital stock of defendant CST and subsequently merged CST into National Starch. National Starch and CST are referred to herein as "the defendants."

III. PATENT VALIDITY

A. The Patent-In-Suit

The patent-in-suit is U.S. 3,708,388 (hereinafter the "'388" patent), entitled "Process of Laminating Using Vinyl Acetate-Ethylene Copolymer Latex Adhesive Composition." The original application for the patent, application Serial No.

622,412, was filed on March 13, 1967 in the names of Martin K. Lindemann and John G. Iacoviello. A continuation application was filed on May 6, 1970, application Serial No. 37,363, and the patent issued to Air Products on January 2, 1973. (AX 1,2).*

The '388 patent deals with adhesives used to manufacture laminates, particularly laminates made from at least one flexible material, such as polyvinyl chloride film ("vinyl"). Vinyl laminates are used to make kitchen cabinets, simulated wood grain furniture, picture frames, luggage, upholstery and other articles. The adhesive of the '388 patent is used in such applications as well as in the packaging industry. (Tr (Erikson) 40-43, 46-47, 125, 127; Tr (Myrick) 156-58; Tr (Donaldson) 176-77).

Although the '388 patent describes several different adhesive compositions, it claims only the kind of composition exemplified by the patent's Example 8. (AX 2, pp. 120-21). The Example 8 adhesive corresponds to two adhesives used commercially today, Airflex 400, manufactured by the plaintiff, and Elvace 1875, manufactured by DuPont under a license from the plaintiff. The same composition corresponds to the defendants' infringing products, as discussed in a subsequent section of this opinion. (Tr (Erikson) 95-96; Tr (Vanderhoff) 343-45, 398-99; AX 680; Tr (Wacome) 463; AX 98, pp. 20-21; Tr (Lindemann) 609, 612-15; AX 3, p. 37 (Paper No. 9, p. 3); Tr (Iacoviello) 2696; Tr (Cordeiro) 708-10).

B. Defendants' Invalidity Contentions

As of October 1, 1982, the United States Court of Customs and Patent Appeals ("CCPA") and the United States Court of Claims were merged to form the United States Court of Appeals for the Federal Circuit ("CAFC"). The new court has exclusive appellate jurisdiction of appeals in all patent infringement actions. 28 USC § 1295(a)(1). In a recent

* The plaintiff's exhibits are referred to herein as "AX ____"; the defendants' exhibits as "TX ____."

decision, *South Corp.* v. *United States,* 690 F.2d 1368, 1369 (Fed. Cir. 1982), the new court ruled that all decisions of its predecessor courts will be considered binding as precedents upon it. Those decisions are therefore controlling here. This Court accordingly relies on CCPA and Court of Claims precedents, and on other well-settled patent authority where CCPA and Court of Claims authority does not exist.

A patent is presumed valid and the burden of establishing the invalidity of any claim of a patent rests on the party asserting invalidity. 35 USC § 282; *Solder Removal Co.* v. *International Trade Comm'n,* 582 F.2d 628, 632-33 (CCPA 1978); *General Motors Corp.* v. *International Trade Comm'n,* 687 F.2d 476 (CCPA 1982); *Stevenson* v. *International Trade Comm'n,* 612 F.2d 546, 551 (CCPA 1979). The mandate of Section 282 is twofold: the party asserting invalidity bears both the burden of going forward with the proofs and also the burden of persuasion. *E.I. du Pont de Nemours & Co.* v. *Berkley & Co.,* 620 F.2d 1247, 1266 (8th Cir. 1980); *Solder Removal,* 582 F.2d at 632.

This presumption, as the Court said in *Plasser American Corp.* v. *Canron, Inc.,* 546 F.Supp. 589, 597 (D.S.C. 1980), is a matter of "real substance and power." The presumption flows from a congressional assumption that the Patent and Trademark Office (hereinafter the "Patent Office") properly applies its acknowledged experience and expertise in the examination of applications. *Solder Removal,* 582 F.2d at 633 n.10; *Plasser,* 546 F.Supp. at 597. The Office's experience and expertise are to be accorded considerable weight where, as here, "intricate questions of chemistry are involved, which are peculiarly within the particular competence of the Patent Office." *Mobil Oil Corp.* v. *W.R. Grace & Co.,* 367 F.Supp. 207, 225 (D.Conn. 1973). To that end, the Patent Office carefully studies the application and thoroughly searches the prior art to ensure that the application complies with all of the applicable statutes and rules before issuing the patent. *E.I. du Pont de Nemours & Co.,* 620

F.2d at 1266. Those statutes include 35 USC §§ 102, 103, and 112, the same sections of the patent statute upon which the defendants here now urge invalidity.

Specifically with regard to defenses based on prior art, while this Court is aware of language in some opinions suggesting that no presumption exists with respect to prior art not cited by the Patent Office, the better rule, as adopted by the CAFC, is that the presumption is not vitiated simply by reliance on prior art which was not cited by the Patent Office. *Solder Removal Co.* v. *International Trade Comm'n,* 582 F.2d 628, 632-33 (CCPA 1978). Where the party asserting invalidity relies on prior art references that were cited to the Patent Office, or are cumulative to those references, the presumption of administrative correctness is necessarily more difficult to overcome. *Solder Removal,* 582 F.2d at 633; *Power Curbers, Inc.* v. *E.D. Etnyre & Co.,* 298 F.2d 484, 493 (4th Cir. 1962); *Marston* v. *J.C. Penney Co.,* 353 F.2d 976, 982 (4th Cir. 1965); *Plasser American Corp.* v. *Canron, Inc.,* 546 F.Supp. 589, 597 (D.S.C. 1980).

Defendants contend that they have rebutted the presumption and that the patent is accordingly invalid. They contend they have proven: (a) that the composition was anticipated under 35 USC § 102 by one or more prior art references; (b) that even if it was not anticipated, it was obvious to persons skilled in the art under 35 USC § 103; (c) that plaintiff committed fraud in obtaining the patent; and (d) that the patent does not comply with the requirements of 35 USC § 112 in that plaintiff did not make the full and complete disclosure required by that statute and did not disclose the best mode known to the inventors for making the adhesive composition. (Tr 21-26).

In considering the defendants' arguments on the validity issue, the Court has evaluated the evidence presented in the following areas: (1) the properties possessed by the adhesive

composition of the '388 patent; (2) the chemical and physical structure of the new composition and the process by which it is made; (3) the claims of the patent and how they define the invention at issue; (4) the scope and content of the prior art; (5) the differences between the claimed adhesive composition and the prior art, particularly the nine references relied upon by the defendants; (6) whether the composition was obvious; (7) the prosecution of the patent in the Patent Office; and (8) the best mode and disclosure contentions of the defendants. The Court will address each of these areas separately.

1. The Adhesive Composition Of The '388 Patent And Its Properties

The disclosure of the '388 patent and the state of the adhesive art at the time of the invention at issue were described by plaintiff's expert witness, Mr. Carl Erikson, who has been active in the adhesives industry since 1939, serving much of his career in adhesives research and manufacturing for the Adhesives Division of the Borden Company, makers of Elmer's Glue. Mr. Erikson's testimony stands unrebutted by the defendants. He described the problems faced by the adhesives industry in the mid-1960's, particularly in regard to laminating, and how the adhesive composition of the '388 patent solved those problems. Mr. Erikson identified six properties which were the most sought after in the theretofore unavailable "ideal" laminating adhesive. (Tr (Erikson) 31-37, 57-65, 78-79, 86, 93-95; AX 775, 801, AA).

As Mr. Erikson testified, the six important properties were: (1) adhesion to difficult-to-bond surfaces, such as vinyl; (2) cohesion or resistance to creep; (3) good aging; (4) flexibility; (5) plasticizer tolerance; and (6) machining properties or ease of mechanical application. The first of these properties, adhesion, is the ability of the adhesive to bond to other surfaces. Adhesion is measured by a "peel" test in which a laminate of vinyl and cloth is pulled apart at a constant rate; the

force required to achieve the delamination is called "peel strength." Cohesion is the ability of the adhesive itself to hold together after setting; it is measured by a test in which a cloth-to-cloth laminate is subjected to delaminating forces by a fixed weight over a given period of time. The extent of delamination is called "creep" and the ability of the adhesive to hold the laminate together in such circumstances is called "creep resistance." An adhesive which has good creep resistance at elevated temperatures is said to have good "heat resistance." Flexibility is the ability of the adhesive film to bend after setting. It is important because laminating adhesives should not crack when the laminate itself bends at normal temperatures of use. Plasticizer tolerance is the ability of the adhesive to perform well in the presence of plasticizers. It is important because plasticizers are usually present in plastic films and are frequently added to adhesives for various reasons. Plasticizer tolerance is measured by adding plasticizer to the adhesive and testing how it responds in peel tests. Machining properties relate to viscosity, speed of set, wet tack and other characteristics affecting how well the adhesive can be applied to the laminating materials in a mechanical operation. (Tr (Erikson) 43-103; AX 791-93, 801, 806, 817, 821, 835, 839, 844-49, 858, 865).

As Mr. Erikson further testified—and again his testimony stands unrebutted—these six properties are all disclosed in the '388 patent for the claimed composition of Example 8. That composition has superior adhesion or peel strength, excellent cohesion or resistance to creep even at elevated temperatures, good retention of peel strength on aging, and good flexibility as shown by its low "glass transition temperature" (0°C), the temperature where it becomes brittle; it has excellent tolerance to plasticizers without loss of peel strength, and good machining properties in its combination of high solids, large average particle size and stabilization with polyvinyl alcohol (hereinafter "PVOH"). Mr. Erikson personally received one of the first samples of Airflex 400, the commercial product corre-

sponding to Example 8, when he was at Borden and, as he testified, he found it to be the first product to provide these six properties long desired by the industry for a laminating adhesive. (Tr (Erikson) 78-79, 83-103; AX AA, AX 798, 803, 806, 835, 839, 852, 858, 864; *see* Tr (Vanderhoff) 270-75).

2. The Structure Of The Product And How It Is Made

The chemistry behind the '388 patent, particularly the chemistry leading to the product of claim 1 as exemplified in Example 8, was explained by Dr. John Vanderhoff, who testified as an expert witness on behalf of the plaintiff. Dr. Vanderhoff is a Professor of Chemistry and Co-Director of the Emulsion Polymers Institute at Lehigh University. In 1965, Dr. Vanderhoff received the Union Carbide award of the American Chemical Society for his work in morphology of latex films. He has over 144 publications and eight U.S. and thirty foreign patents, mainly dealing with emulsion polymerization. (AX 851; Tr (Vanderhoff) 192-99). On these issues of the basic chemistry involved with the '388 patent, his testimony was unrebutted.

According to the testimony given by Dr.Vanderhoff, which the Court accepts as credible, the vinyl acetate-ethylene copolymer called for by claim 1 of the '388 patent is the product of a chemical reaction, a polymerization, in which many units of the two monomers, vinyl acetate and ethylene, link together to form very large polymer molecules. This reaction occurs in a water-based emulsion, or latex, which is stabilized with a protective colloid, particularly PVOH, to keep the emulsion from separating.

In this process, the initial ingredients—water, vinyl acetate, polyvinyl alcohol and other ingredients—are charged to a polymerization reactor. Ethylene, a gas, is then pumped into the reactor and the reactor contents are stirred for a certain time to dissolve some of the ethylene in the liquid. This is called the

"equilibration" period. The reaction is then started, and maintained, by adding an "initiator" to the reactor. An initiator is part of a "redox catalyst" which causes the polymerization to occur. The process is continued over a period of hours, during which time ethylene is added to the reactor under pressure. This process results in the unique composition described in Example 8 and claimed in the claims of the '388 patent. (Tr (Vanderhoff) 201-03, 227-39, 256-64). The vinyl acetate-ethylene copolymer produced in this process is suspended in the water as tiny particles and, with the PVOH, makes up what is referred to as the "solids" of the latex. (Tr (Erikson) 74-78; Tr (Vanderhoff) 228, 271).

When vinyl acetate and ethylene are copolymerized in the presence of a protective colloid, particularly PVOH, according to the process disclosed in the '388 patent, two basic polymer components, a "soluble fraction" and an "insoluble fraction," are produced in substantial quantities. The relative amounts of these two fractions are measured by placing the copolymer in benzene and measuring the amount that remains insoluble, that being the insoluble fraction; the remainder constitutes the soluble fraction. Solvents other than benzene, such as toluene, can also be used for this measurement. (Tr (Vanderhoff) 202-03, 244-46, 273-75; AX 858; Tr (Erikson) 83-84).

The excellent adhesive and cohesive strengths of the '388 composition are directly related to the presence of these two fractions. (Tr (Vanderhoff) 202-03, 244-46, 273-75; AX 858). The soluble fraction contributes to the good adhesive, or peel, strength of the adhesive composition because it can easily "wet" and exercise its affinity for the surfaces of the substrates, including vinyl, with which it is used. (Tr (Vanderhoff) 202, 246; Tr (Erikson) 43). The insoluble fraction contributes to the good cohesive strength, or creep resistance, of the adhesive composition, because the molecules that make up the insoluble fraction are strongly bound together. Just as the solvent cannot dissolve this fraction by separating its molecules, the heat and

stress encountered in adhesive applications do not separate them; the result is high cohesive strength. (Tr (Vanderhoff) 246-50; AX 852). The combination of soluble and insoluble fractions in the '388 composition, which contribute to good adhesive and cohesive strengths, is an important factor in distinguishing the product from the prior art, as discussed in subsequent sections of this opinion.

3. The Claims Of The '388 Patent

For purposes of both the validity and the infringement issues, the Court must focus on the claims of the patent. The claims define the metes and bounds of the patented invention and are to be construed in light of the specification and the proceedings in the Patent Office which led to the issuance of the patent, all with the view of ascertaining the invention. *United States* v. *Adams,* 383 U.S. 39, 48-49 (1966); *Astra-Sjuco, A.B.* v. *International Trade Comm'n,* 629 F.2d 682, 686 (CCPA 1980); *In re Myers,* 410 F.2d 420, 425 (CCPA 1969).

The '388 patent contains eleven claims, all of which are asserted against defendants here, and all of which the defendants contend are invalid over the prior art. The first three claims define the adhesive composition itself. Claims 4 through 7 define a process for manufacturing a laminate using the adhesive composition defined in claims 1 through 3. The last four claims, claims 8 through 11, define the laminate produced according to the processes of claims 4 through 7. (AX 1 (Col. 15-16)).

Claim 1 reads:

> 1. An adhesive composition consisting essentially of an aqueous vinyl acetate-ethylene copolymer emulsion having from about 5 to about 40 percent by weight ethylene, a solids content of from 45 to about 60 percent by weight and an intrinsic viscosity of from 1 to 2.5 dl/g as measured in benzene at 30°C, the vinyl acetate and ethylene monomers copolymerized in the presence of a protective colloid

in an amount from about 0.05 to about 2 percent by weight based upon the total weight of the emulsion, said protective colloid being selected from the group consisting essentially of a polyvinyl alcohol and hydroxyethyl cellulose.

The claim begins with the preamble "an adhesive composition." Read in light of the specification, this expression focusses the claimed invention on adhesive compositions of the kind dealt with by the patent, namely, adhesive compositions useful for making flexible laminates. The claim, for example, does not cover other kinds of emulsions such as latex paints, paper coatings, textile binders and other products which might incidentally possess some adhesive properties, but would not be suitable as adhesive compositions, particularly for making laminated articles. (Tr (Vanderhoff) 360-61, 2779-80; AX 1; Tr (Lindemann) 1472).

The next element of claim 1 is the phrase "consisting essentially of." This term of patent art serves to limit or close the claim to the inclusion of certain additional, nonrecited ingredients, specifically those which, in nature and amount, would change the basic and novel characteristics of the claimed composition. It does not close the claim to other ingredients which do not change the adhesive's basic character. *Ex parte Davis,* 80 USPQ 448, 450 (Bd. App. 1948); *see* Tr (Witherspoon) 1070-71, 1077-78.

Claim 1 next recites "an aqueous vinyl acetate-ethylene copolymer emulsion." This limitation defines the basic structure as being a copolymer of vinyl acetate and ethylene. It also defines the basic physical form as a water-based latex or emulsion. (Tr (Vanderhoff) 271; Tr (Erikson) 65-78; AX 809-12, 816, 818, Z; Tr (Lindemann) 1510-12).

Claim 1 also requires a certain percentage by weight of copolymerized ethylene, 5 to 40%. The undisputed testimony is that this ethylene content, as disclosed in the specification, results in an adhesive that exhibits good flexibility. The

flexibility facilitates use with flexible laminates and also contributes to the adhesive's ability to adhere to hard-to-stick vinyl and other plastic substrates. While the claimed ethylene range is from 5 to 40%, claim 3 narrows the range to above 15%, a range which covers most of the products here at issue. (AX 1 (Col. 15-16); Tr (Erikson) 84-85, 92-93; AX AA; Tr (Vanderhoff) 220-27, 272, AX 806, 835, 839, 858).

The claim also specifies the solids content of the adhesive composition as being between 45 to 60%. This range of solids is necessary for the adhesive composition to have good machining properties and formulating characteristics. (Tr (Vanderhoff) 272; Tr (Erikson) 76-77).

The claim requires a copolymer with an intrinsic viscosity between 1 and 2.5. As Dr. Vanderhoff testified, this means, first of all, that the copolymer must include a soluble fraction since, by definition, only soluble polymers can have intrinsic viscosities. It also indicates that the soluble fraction has a relatively high molecular weight. This high molecular weight soluble fraction permits the composition to wet and attain intimate contact with the surface of the substrate and is, in large part, responsible for the superior peel strength of the composition. (Tr (Vanderhoff) 202, 210-16, 272-73, 300, 2792; AX 1 (Col. 5, 11. 12-15); AX 829-30, 853).

The claim also includes what is in effect a process limitation: the copolymerization of vinyl acetate and ethylene must be carried out in the presence of a protective colloid, either PVOH or hydroxyethyl cellulose. The patent discloses that the preferred protective colloid is PVOH, which, in its partially acetylated form as used in all the compositions here at issue, is specifically called for in claim 2. As Dr. Vanderhoff explained, it is the copolymerization in the presence of a protective colloid, specifically the PVOH of Example 8, which produces a product having the insoluble fraction found in the composition of claim 1 and in the commercial products involved in this action. The insoluble fraction is, as noted above, responsible for the

outstanding creep resistance properties and cohesive strength of the adhesive composition. (Tr (Vanderhoff) 202, 234-50, 273-75; AX 815, 819, 825-26, 832, 838, 852, 858).

Claim 1 also defines the amount of protective colloid used to obtain the results just discussed as being from about 0.05 to about 2 weight percent.

4. The Applicable Law Regarding 35 USC §§ 102 and 103

Defendants contend that the patent is invalid under 35 USC §§ 102 ("anticipation") and 103 ("obviousness"). The law regarding § 102 is simply stated. Under 35 USC § 102, a patent claim is anticipated only if the claimed subject matter is identically disclosed in one piece of prior art. *In re Marshall,* 578 F.2d 301, 304 (CCPA 1978). Furthermore, a prior art reference which contains a broad general disclosure requiring guessing, testing, speculation or "picking and choosing" from an encyclopedic disclosure will not anticipate. *In re Arkley,* 455 F.2d 586 (CCPA 1972); *In re Samour,* 571 F.2d 559, 562 (CCPA 1978); *General Battery Corp.* v. *Gould, Inc.,* 545 F.Supp. 731, 740 (D.Del. 1982).

The law regarding § 103 is outlined by the Supreme Court in *Graham* v. *John Deere,* 383 U.S. 1, 17 (1966). Following the analytical procedures set out in that case, the Court here has considered: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims in issue; (3) the level of ordinary skill in the pertinent art; and (4) whether the subject matter of the claimed invention, as a whole, is unobvious in light of the differences. Objective considerations such as commercial success, long-felt but unresolved needs and the failure of others to arrive at the same result for solving those needs are important considerations in evaluating the issue of obviousness.

In determining the issue of obviousness of a chemical composition, it must be kept in mind that section 103 requires

consideration of the invention as a whole, and, as a matter of law, a new chemical composition is considered inseparable from all of its properties and from the manner of making it. *In re Papesch,* 315 F.2d 381, 391 (CCPA 1963); *Eli Lilly & Co.* v. *Premo Pharmaceutical Laboratories, Inc.,* 630 F.2d 120, 126-33 (3rd Cir. 1980). Thus, the existence of novel or superior unexpected properties, undisclosed by the prior art, weighs heavily in favor of a conclusion that the claimed composition is not obvious. *In re Albrecht,* 514 F.2d 1389, 1394-95 (CCPA 1975); *In re Blondel,* 499 F.2d 1311 (CCPA 1974); *In re Lunsford,* 357 F.2d 380, 384-85 (CCPA 1966); *In re May,* 574 F.2d 1082, 1092-94 (CCPA 1978); *Eli Lilly & Co.,* 630 F.2d at 126-33. And where the prior art teaches away from the claimed invention, that is highly probative evidence that the invention is nonobvious. *United States* v. *Adams,* 383 U.S. 39 (1966); *In re Mercier,* 515 F.2d 1161, 1165-66 (CCPA 1975); *In re Rosenberger,* 386 F.2d 1015, 1018 (CCPA 1967); *American Original Corp.* v. *Jenkins Food Corp.,* (696 F.2d 1053 (4th Cir. 1982)).

Another important consideration in evaluating obviousness is that the Court does not apply an "obvious to try" test. In other words, merely because one skilled in the art might "try" to perform the claimed process or make the claimed product, that does not mean that the invention is obvious within the meaning of 35 USC § 103. *In re Goodwin,* 576 F.2d 375, 377 (CCPA 1978); *In re Antonie,* 559 F.2d 618, 620 (CCPA 1977); *Nova Industri A/S* v. *Travenol Laboratories, Inc.,* 677 F.2d 1202, 1208 (7th Cir. 1982); *Trio Process Corp.* v. *L. Goldstein's Sons, Inc.,* 461 F.2d 66, 72 n.18a (3rd Cir. 1972). Similarly, the Court should not use hindsight in evaluating obviousness. *Graham,* 383 U.S. at 36; *In re Nomiya,* 509 F.2d 566 (CCPA 1975); *Tights, Inc.* v. *Acme-McCrary Corp.,* 541 F.2d 1047, 1059-60 (4th Cir. 1976); *Jamesbury Corp.* v. *United States,* 183 USPQ 484, 491 (Ct. Cl. Tr. Div. 1974), *aff'd per curium,* 518 F.2d 1384 (Ct. Cl. 1975).

Objective manifestations of nonobviousness, sometimes called secondary considerations, are important factors on this

issue, particularly where the dangers of employing hindsight are great. *Black and Decker Mfg. Co.* v. *Sears Roebuck & Co.*, 679 F.2d 1101, 1104 (4th Cir. 1982); *Tights*, 541 F.2d at 1059; *In re McLaughlin*, 443 F.2d 1392, 1396 (CCPA 1971); *Shackelton* v. *J. Kaufman Iron Works, Inc.*, 689 F.2d 334, 340 n.4 (2nd Cir. 1982).

These objective indicia include commercial success, satisfaction of a long felt need, and industry copying of the patented invention. *In re Meng*, 492 F.2d 843, 846 (CCPA 1974); *In re Tiffin*, 443 F.2d 394, 398 (CCPA 1971); *In re Sernaker*, No. 82-579 Slip Op. at 11 (Fed.Cir. February 28, 1983). Significant commercial success makes it highly unlikely that the invention was obvious, *Black and Decker*, 679 F.2d at 1103, "because . . . [commercial success] may be the only warning to a judge that he is engaged in a backward vision when an invention that seems obvious to him eluded those skilled in the art at the time the invention was created despite . . . the possibility of significant commercial reward." *Shackelton*, 689 F.2d at 340 n.4.

5. Scope And Content Of The Prior Art

There were substantial conflicts in testimony regarding the disclosures of the prior art relied upon by the defendants; those conflicts are discussed in the following section dealing with differences between the prior art and the claimed invention. On the issue of what particular references make up the prior art, there was little dispute. The testimony established that the relevant prior art can be divided into two general categories. One is the adhesives art; the other is the vinyl acetate-ethylene copolymerization art. Each of defendants' nine principal references, as well as the other prior art cited by defendants, falls into one or the other of these groups.

With respect to the adhesives art, the record establishes that there were latex adhesives known to the art before the

invention at issue. The first of these was introduced to the market in the 1940's by DuPont and others. They were homopolymers of vinyl acetate, that is, they contained no comonomers. In use, they formed stiff, rigid films, and while they were, and are, excellent for some paper-to-paper and wood glue applications, they suffered serious deficiencies in respect to general laminating applications. They had poor adhesion to hard-to-bond surfaces, such as vinyl films, and they were rigid, inflexible and brittle. (Tr (Erikson) 78-80, 82-84, 86-87, 94-95, 102-03; Tr (Lindemann) 1184-86; AX 272-74.

By the mid-1960's, "copolymer" adhesives were introduced in an attempt to soften the polymer by adding "internal plasticizers." These products employed comonomers with the vinyl acetate but, unlike the processes here at issue, the copolymerizations did not employ ethylene and were carried out at atmospheric, rather than elevated, pressure. Gelva TS-100, manufactured by the Monsanto Company, and Daratak B, manufactured by Dewey and Almy (later, W.R. Grace & Co.), were two such products. Both products had low insolubles and exhibited poor cohesive strength and creep resistance. Neither possessed the combination of the six properties which Mr. Erikson established were the properties of an ideal laminating adhesive. (Tr (Erikson) 78-79, 82-83, 95, 140-42; TX 34-36, 39; AX 272-74, 757, p. 470; Tr (Lindemann) 1166-69, 1510-14).

The other area of prior art here involved relates to the early processes used to make vinyl acetate-ethylene copolymers. The most significant of this prior art is found among patents of plaintiff's predecessor in interest, the Air Reduction Company (hereinafter "Airco") (AX 900). The record is undisputed that in 1963, Airco undertook an extensive research program aimed at using ethylene as a comonomer with vinyl acetate. The program was conducted under Mr. Lindemann's direction. (Tr (Lindemann) 1211-12, 1217, 1225; TX 59, 61-65, 67). At the time this research program was begun in 1963, Mr. Lindemann

was aware of at least some of the earlier technologies for copolymerizing vinyl acetate and ethylene at pressures low enough to be commercially feasible. (Tr (Lindemann) 1194-97, 1211-12; TX 58, pp. 3-4, 62, p. 10). The German company, Farbwerke Hoechst, had published a patent application Auslegeschrift No. 1,127,085, on this subject in 1962. (TX 3, 3A, 9). Another German company, BASF, had issued a French patent, No. 1,226,382, on the same subject in February 1960. (TX 6, 6B, 7, 8, 10). Other European companies, including Wacker Chemie GmbH, were experimenting in these same technological areas. (Tr (Lindemann) 1218-19, 1445-79; AX 224-35, 696-97, 755; TX 21, 22). Samples of some Wacker experimental products, labeled T690 and T700, were forwarded to Airco's Mr. Jaffe in 1963. (AX 225). They were evaluated in paint end-use application tests, found severely wanting and thereafter ignored. (Tr (Lindemann) 1465-76; TX 22; AX 226; Blades Dep. 61, 71-72, 103, 165-66, 178-80; Jaffe Dep. 174-81, 193). Also, other American companies had filed patent applications on various processes and products relating to vinyl acetate-ethylene copolymerization. The Worrall patent, U.S. 3,355,322, relates to this area and was filed by the Monsanto Company in 1960. (TX 15; Tr (Lindemann) 1540).

From that background, the record shows Mr. Lindemann worked toward a new process for copolymerizing vinyl acetate and ethylene which led to a number of new products for which the following patents were granted: paints (U.S. 3,404,113, 3,440,199 and 3,844,990); paper coatings (U.S. 3,404,112, 3,645,952 and 3,716,504); fabric coatings (U.S. 3,345,318, 3,440,200 and 3,526,540); and non-woven adhesive binders (U.S. 3,380,851, 3,498,875 and 3,526,538). (AX 900; TX 19; TX 78; Tr (Lindemann) 1288, 1293-1311, 1444, 1500-04; TX 92; Blades Dep. 98-99, 225-28, 238-39; Jaffe Dep. 256). All these patents preceded the work leading to the invention at issue and all are prior art here.

6. The Differences Between The Prior Art And The Claimed Adhesive Composition

In support of their argument that the adhesive composition claimed in the '388 patent was not new, defendants primarily rely on nine different specific prior art references, as well as on Daratak B and other early adhesive products.

Both parties presented the testimony of expert witnesses on the teachings of these references to persons of ordinary skill in the art in the relevant time period. The testimony of the experts conflicted on virtually all major issues. The plaintiff's principal expert witness on these issues was Dr. Vanderhoff, who is described earlier in this opinion. The defendant's principal expert was Dr. Norman Gaylord, who, since 1961, has had his own private research consulting company (Tr (Gaylord) 1701-02). The Court found Dr. Vanderhoff to be a highly qualified and objective expert whose opinions and related testimony were based upon a thorough and careful study of the relevant materials, as well as upon his in-depth experience in the emulsion polymerization field. The Court accepts his testimony, on the issues addressed below, as being far more credible than Dr. Gaylord's. Dr. Gaylord, to be sure, is a highly qualified polymer scientist. (TX 610; Tr (Gaylord) 1701-04). However, his testimony did not reflect the considered study and objectiveness of Dr. Vanderhoff. On the contrary, his testimony could be characterized more as advocacy than as objectivity and the accuracy of his testimony, as shown by the cross-examination, was frequently in doubt. These observations, coupled with a tendency of Dr. Gaylord to evade direct questions, led the Court to fully consider, but in most cases reject, Dr. Gaylord's testimony as being less credible than Dr. Vanderhoff's.

Defendants' other expert, and fact, witness was Mr. Lindemann, one of the inventors of the '388 patent. While the Court has fully considered and weighed Mr. Lindermann's testimony, the Court finds that his testimony does not impair the credibility

of Dr. Vanderhoff's testimony. This is especially true in view of the fact that Mr. Lindemann cannot be considered to have the same degree of objectivity as Dr. Vanderhoff; Mr. Lindemann himself was instrumental in, if not responsible for, CST's infringing activities. For this same reason, the Court gives no weight to the alleged statement made by Mr. Lindemann to Dr. Ungefug, another CST employee, that Mr. Lindemann considered the patent to be invalid. (Tr (Ungefug) 517). Mr. Lindemann, after all, did execute the declaration, required of all patent applicants to be made under risk of perjury, that the application leading to the patent did disclose and claim an invention. (AX 2, pp. 31-32; Tr (Lindemann) 1538-39).

(a) The French '382 Patent

Defendants rely on the French patent, No. 1,226,382, issued to BASF on July 11, 1960. (TX 6, 6B, 7, 8, 10). The patent discloses one of the early vinyl acetate-ethylene copolymerization processes, and resulting products, known before the basic work began at Airco in the early 1960's. As Dr. Vanderhoff testified, both the process and the resulting products are unlike those of the '388 patent. The basic differences are apparent from two requirements set forth in the '388 patent's claim 1.

First, claim 1 requires that the copolymer product have an intrinsic viscosity of between 1 and 2.5. That means that the copolymer must have a soluble fraction and that the soluble fraction must have a relatively high molecular weight. (Tr (Vanderhoff) 2788, 2791-93). Second, claim 1 requires that the polymerization be conducted in the presence of a protective colloid. As Dr. Vanderhoff testified, the French patent teaches that these two requirements are inconsistent with each other. If one carries out the polymerization of the French patent in the presence of a protective colloid, specifically PVOH, as shown only in Example 5 of the French patent, then there is no soluble fraction at all. As the patent says, the product of Example 5 was "insoluble in cyclohexanone." (TX 8, p. 7, ftn. (1); Tr

(Vanderhoff) 2783-84, 2791-93). This is a basic and important difference from the adhesive viewpoint, because the soluble fraction, present in the '388 composition but absent from the French patent, gives rise to the high peel strengths of the '388 adhesive composition. (Tr (Vanderhoff) 202, 246).

In short, the testimony established that the French patent's products do not meet the two basic requirements of claim 1: (1) copolymerization in the presence of a protective colloid and (2) a soluble fraction with an intrinsic viscosity in the claimed range. For that reason alone the French patent does not anticipate the '388 invention.

Defendants' expert testified that the statement in the French patent that the product of Example 5 was insoluble in cyclohexanone was a mistake. (Tr (Gaylord) 1734-35, 1848-55). He maintained that the technician who was responsible for measuring the intrinsic viscosity and K-index on that product perhaps did not wait long enough for the polymer to dissolve, or simply assumed incorrectly that there was no soluble fraction in the polymer. (*Id.*). This testimony, however, is nothing but unsupported speculation. There is no reason to conclude that the product of Example 5 was anything other than what the French patent said it was. This is particularly so in view of Dr. Vanderhoff's testimony that one of the inventors of the French patent, Dr. Hans Fikentscher, is a respected scientist and was himself the originator of the K-index test to which the indicated insolubility relates. Dr. Vanderhoff testified that the data reported in the table should be read as written. (Tr (Vanderhoff) 2792-93; *compare* Tr (Gaylord) 1853-55).

Other examples of the French patent relied upon by defendants' expert, specifically Examples 6, 7, 8 and 15, do not aid their anticipation argument because they use substantial amounts of surfactants in the emulsifying system. (Tr (Vanderhoff) 2785-86; Tr (Lindemann) 1488-89; Tr (Gaylord) 1848-49). Consequently, those examples do not carry out the

copolymerization "in the presence of a protective colloid" as required by claim 1 of the '388 patent; on the contrary, they use a mixture of surfactants and protective colloids. Moreover, the high level of surfactants used in those examples is not permitted by the claim language "consisting essentially of"; the surfactants would change the basic and novel characteristics of the adhesive compositions by deleteriously affecting any adhesive properties the product might have, as defendants' expert admitted. (Tr (Gaylord) 1858; AX 3A (Col. 1, 11. 12-23)).

The claimed '388 composition further requires a solids content of between 45 and 60%. None of the relevant examples of the French patent discloses solids in this range; the highest solids of the examples using PVOH is Example 6, which has a solids content of 38.5%, and whose product is insoluble in cyclohexanone. (TX 8, p. 7; Tr (Vanderhoff) 2781-83). While the French patent suggests that the solids content may be increased by blowing a stream of nitrogen over the emulsion (TX 8, p. 6), Dr. Vanderhoff testified that it would be very difficult to raise the solids content from this low value through the nitrogen stream technique and would require a research program in itself. Even if it could be done, it would inevitably change the properties of the latex. (Tr (Vanderhoff) 2782). The French patent does not teach what those changed properties would be if the solids were so raised to the claimed range. Consequently, the French patent does not meet this limitation of the claim.

The differences between the French patent's products and those at issue are further apparent from the French patent's disclosure of properties related to its products' adhesiveness. The French patent states that: "The products consisting of . . . 45 to 32% of ethylene are very adhesive, whereas those containing . . . 20 to 5% ethylene adhere hardly at all. . . ." (TX 8, p. 5). All of the examples relied upon by the defendants have ethylene contents falling within the "20 to 5%" range, where the French patent says they are non-adhesive. Yet the

product of Example 8 of the '388 patent, as well as the commerical products corresponding thereto, have ethylene contents in that same range, and they, obviously, are very adhesive, indicating that the products must be quite different from those of the French patent. (AX 1 (Example 8, Col. 13, l. 18); Tr (Vanderhoff) 272, 283, 287-89, 292-94; AX 220, 580). At trial defendants attempted to avoid this conclusion that the French patent is basically different from the '388 patent by amending the French patent's translation. But the final amendment offered by defendants, even if correct, does not change the basic fact that the teachings of the French patent are very different from those of the '388 patent. (TX 10, p. 5; Tr (Lindemann) 1267-74).

The differences in properties between the French patent and the '388 patent are due, as Dr. Vanderhoff testified, to the differences in processes. Unlike the '388 patent, the French patent's process does not employ an equilibration period to permit the ethylene to dissolve in the other ingredients before the reaction is initiated. (Tr (Vanderhoff) 2789-90). Moreover, according to the French patent the process may be carried out in either a batch or continuous manner, a choice which is antithetical to the '388 patent's teaching that the batch-equilibration technique must be employed. (Tr (Vanderhoff) 2790).

In addition, with respect to the French patent's use of PVOH in Example 5, the record shows that the thermal polymerization, the non-redox catalyst, the high persulfate catalyst concentration and the high reaction temperature—none of which are used in Example 8 of the '388 patent—all led to the extensive cross-linking and branching giving rise to complete insolubility. (Daniels Dep. 313-16, 362-64). The particular catalyst of the French patent also inevitably leads to the formation of surfactant-like products which contribute to poor adhesive properties. (Daniels Dep. 311-12, 378-83, 386, 389). Finally, the French patent teaches that the high solids necessary

for adhesive applications are directly obtained only with a surfactant-based system (specifically Example 10 of the French patent), rather than the PVOH system of the '388 patent. (Tr (Vanderhoff) 2793-97). All these process differences lead to the conclusion that the product of Example 5 of the French patent could not have had the ideal adhesive properties possessed by the composition of the '388 patent. (Tr (Vanderhoff) 2785-86, 2788-89).

All in all, then, the French patent does not anticipate; on the contrary, it "teaches away" from the invention of the '388 patent. (Tr (Vanderhoff) 2797). If a person skilled in the art in 1967 set out to make a laminating adhesive, the French patent would have led him in a direction opposite to that of the '388 patent. (Tr (Vanderhoff) 2793-97).

(b) The German '085 Application

Defendants rely on the German patent application, Auslegeschrift No. 1,127,085, which also relates to an early vinyl acetate-ethylene copolymerization process. (TX 3, 3A, 9). While the product of this process has at least some adhesive properties, the product is not a laminating adhesive and it does not have the unique combination of properties of the claimed product. (Tr (Vanderhoff) 2797-98; AX 907/907A).

The thrust of the German application is directly contrary to the '388 patent's teaching that most, if not all, of the vinyl acetate should be put into the reactor at the start of the reaction. The German application teaches that only by adding vinyl acetate to the reaction vessel continuously throughout the polymerization (sometimes called "delayed addition"), can a satisfactory product be produced. (Tr (Vanderhoff) 2798-2801; TX 9, p. 5; Tr (Gaylord) 1893). This teaching is contrary to what was discovered by the inventors of the '388 patent and the resulting products are consequently different. (Tr (Vanderhoff) 203, 2798-99, 2803; AX 681, pp. 33-34).

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At least two basic differences are reflected by the claims of the '388 patent as compared to the German application. First, claim 1 requires an intrinsic viscosity of between 1 and 2.5. There is no such disclosure in the German application, and there is no teaching that the German application's product has a soluble fraction which the test for intrinsic viscosity requires. (Tr (Vanderhoff) 2800-02). At trial, defendants' witnesses suggested that the German application's dispersions would have intrinsic viscosities in the claimed range because, they argued, the "percent elongation at break" reported for the German application's polymers is consistent with the high molecular weights indicated by the '388 patent's intrinsic viscosity range. (Tr (Lindemann) 1204-05, 1430-34; Tr (Gaylord) 1749, 1895-1904). The basic error here is that percent elongation—no matter what it says about molecular weight —says nothing about intrinsic viscosity, a property which requires the existence of a soluble fraction. (Tr (Vanderhoff) 2800-02; Tr (Gaylord) 1749, 1883-84, 1887). Moreover, on cross-examination, defendants' experts were unable to cite any reports or references directly relating the percent elongation to molecular weight. (Tr (Lindemann) 1433-34; Tr (Gaylord) 1895-1904). At most, the elongation figures recited in the '085 application show a correlation between elongation at break and percent ethylene, but the correlation cannot be extended to molecular weight. (Tr (Vanderhoff) 2800-01; TX 60; AX 594).

Second, claim 1 requires copolymerization in the presence of a protective colloid; there is no such teaching in the German application. On the contrary, conventional surfactants are used throughout. Thus, even though PVOH was a known emulsifier at this time, as evidenced by the Goldberg patent (TX 28) and other references, the German application taught that other emulsifiers should be used instead. (Tr (Vanderhoff) 2801-02).

Defendants argue that the German application does teach the use of a protective colloid and that the German application's discussion of the nature of the emulsification system to be employed is mistranslated from the German into the English version. (Tr (Lindemann) 1428-29). The German application says "surface-active substances and, *if required,* of protective colloids . . ." should be used. (TX 10, p. 3 (emphasis added)). Defendants contend that "if required," should be "if the occasion arises" or "if the occasion warrants." (Tr (Lindemann) 1429-30). Even if the Court were to accept defendants' translation of the German application, this does not change this Court's finding that the application prefers the use of surfactants in the emulsification system "*and,*" alternatively, provides for the use of protective colloids, but only in combination with relatively high levels of surfactants.

In that regard, the Court notes that in the Canadian and British equivalent patents of the German application, namely, Canadian Patent No. 713,625 (TX 4, p. 4, l. 10), and British Patent No. 991,550 (TX 5, p. 2, l. 39), the disputed phrase is translated from the German to be "if necessary." Accordingly, this Court finds that the appropriate interpretation of the German patent is that protective colloids may be added to the surfactants "if necessary," but that surfactants should always be used.

In summary, the German application, like the French patent, does not anticipate, but rather teaches away from the '388 invention. If one set out to make a laminating adhesive and started with the German application, one would have used continuous vinyl acetate addition, and would have used surfactants rather than PVOH. One skilled in the art would not have been led to the basic discovery embodied in the '388 invention. (Tr (Vanderhoff) 2802-03).

(c) The Worrall '322 Patent

United States Patent No. 3,355,322, issued to Worrall, is another of the early patents dealing with the copolymerization

of vinyl acetate and ethylene; it was filed by Monsanto in 1960. (TX 15, 15A). Worrall is one of the references which was considered by the Patent Office examiner during the prosecution of the application for the '388 patent-in-suit. (AX 1-2).

Defendants contend that Worrall anticipates the '388 invention. The Court, however, takes note of the fact that, although this application was filed in 1960, Monsanto was still marketing its non-ethylene-containing laminating adhesive, Gelva TS-100, as late as 1966 when Airco's inventors discovered the '388 adhesive composition. (Tr (Jaffe) 525). Moreover, when Monsanto did decide to market a vinyl acetate-ethylene adhesive it purchased defendants' E-200 product and resold it as Gelva TS-125, rather than manufacture its own product according to Worrall. (AX 128, 768, p. 11). If Worrall anticipated the '388 invention as defendants contend, Monsanto would, more probably than not, have had this commercially-successful product out in the market in the very early 1970's.

As Dr. Vanderhoff testified, Worrall relates generally to compositions based on copolymers of ethylene and vinyl acetate which are suitable for use in coating applications, particularly for coating fibrous materials such as paper or textiles. Such materials do have some adhesive properties, but Worrall does not teach, nor do Worrall's products possess, the properties or the laminating utility of the adhesive composition of the '388 patent. (Tr (Vanderhoff) 2804-05; AX 907/907A; Tr (Gaylord) 1883-84).

While Worrall is more relevant to the '388 invention than the French or German references, it does not teach basic elements of claim 1, namely copolymerization in the presence of PVOH (to get the insoluble fraction) and an intrinsic viscosity of between 1 to 2.5 (corresponding to the soluble fraction). As to the first, Worrall's examples all use substantial amounts of emulsifiers and, while there is a general disclosure of PVOH, there is no indication that, if used alone, superior properties

would result. As to the second, there is no teaching of either a soluble fraction or an intrinsic viscosity. (Tr (Vanderhoff) 2805-08, 2810; Tr (Gaylord) 1883-84, 1905; AX 907/907A).

Defendants' expert contended that the disclosure in Worrall of a melt index is indicative of high molecular weight, and hence, high intrinsic viscosity. (Tr (Gaylord) 1763-64). But Dr. Vanderhoff pointed out that this does not teach the existence of a soluble fraction. (Tr (Vanderhoff) 2810). Additionally, defendants offered no evidence of any actual correlation between the melt index of vinyl acetate-ethylene copolymers and molecular weight (Tr (Gaylord) 1905), and the Court cannot find that the copolymers of Worrall had a soluble fraction with an intrinsic viscosity within the range of the claims of the '388 patent. (Tr (Vanderhoff) 2810). Defendants' expert also found teachings of good aging characteristics in Worrall, but it is apparent that the properties referred to relate only to discoloration, not to anything having to do with adhesive performance. (Tr (Gaylord) 1774).

For these reasons, the Worrall patent, while more relevant to the '388 invention than any of the other patents relating to work earlier than the Airco work, does not anticipate. Like the other references, it points in a direction away from the invention. One would not have been led by Worrall to the use of PVOH alone to get the desirable and unexpected properties of the '388 patent. (Tr (Vanderhoff) 2808-09).

(d) Lindemann And Volpe U.S. Patent No. 3,380,851

Defendants also rely on United States Patent No. 3,380,851, issued to Martin K. Lindemann and Rocco P. Volpe on April 30, 1968, (TX 16/16A). This is another patent which was before the Patent Office examiner during his examination of the applications underlying the '388 patent-in-suit. (AX 1-2). The Court finds that this patent is the most relevant of the Airco patents predating the '388 invention because, as Dr. Vanderhoff testified, it discloses both the equilibration process

and adhesive uses. (Tr (Vanderhoff) 2810-11). But it does not disclose the '388 patent's adhesive composition.

The '851 patent relates generally to adhesive binders for non-woven fabrics. (Tr (Vanderhoff) 2810). Such fabrics are composed of loosely-assembled webs of fibers which are bound together with the binder. (TX 16, Col. 1, 11. 23-25). The binder is a latex copolymer of vinyl acetate and ethylene, but a third monomer, N-methylol acrylamide (hereinafter referred to as "NMA"), has to be added to increase the binder's cohesive strength. (Tr (Vanderhoff) 2811-12). While the '851 patent's product has some adhesive properties, it is not the adhesive composition of claim 1 and does not possess the properties which that adhesive possesses. (Tr (Vanderhoff) 2810; AX 907/907A; Tr (Gaylord) 1883-84).

The '851 patent does not teach copolymerization in the presence of PVOH. (Tr (Vanderhoff) 2813). The '851 patent teaches that an emulsifying agent is required, and it specifically refers to various non-ionic emulsifying agents and a series of surfactants. (Tr (Vanderhoff) 2813; TX 16 (Col. 3, 1. 40-Col. 5, 1. 35)). The '851 patent discourages the use of colloids; it says, "it is preferred to maintain the colloid concentration at the lowest level possible." (TX 16, Col. 5, 11. 17-18). In short, the '851 patent shows no preference or appreciation that any particular benefits can be derived through the use of PVOH alone. (Tr (Vanderhoff) 2813-14). This finding is reinforced by the fact that in the sole working example, Example 1, no protective colloid whatsoever is employed, but instead three surfactants, Igepal 887, Igepal 630, and sodium lauryl sulfate, are used. (TX 16, Col. 8, 11. 62-73; Tr (Vanderhoff) 2813; Tr (Gaylord) 1916-17).

In summary, the basic teachings of the '851 patent and the '388 patent are diametrically opposed. The '851 patent teaches that one must employ a cross-linking third monomer, NMA, to get cohesive strength. It is a central aspect of the '388 invention

that cross-linking third monomers need not be used, but that when PVOH is used alone, as taught by Example 8, the right balance of solubles and insolubles is obtained. Again, the '851 patent does not anticipate; its teachings are in a direction opposite to that of the invention at issue. (Tr (Vanderhoff) 2814).

(e) Chapman, United States Patent No. 2,543,229

Defendants also rely on United States Patent No. 2,543,229, issued to Chapman on February 27, 1951, based on an application filed April 27, 1948. (TX 25). Chapman does relate generally to vinyl acetate-ethylene copolymers which are described as useful for laminating polyethylene (Tr (Vanderhoff) 2814-16), but it adds nothing to the prior art which was before the Patent Office examiner during his consideration of the patentability of the applications leading to the '388 patent-in-suit.

The Chapman patent does not describe an emulsion polymerization. It describes solution polymerizations which result in products entirely different from the products here at issue. (Tr (Vanderhoff) 2816-17). Chapman does not disclose any solids contents, nor does it give any indication of the intrinsic viscosity of its products. (Tr (Vanderhoff) 2817-18). There is absolutely no suggestion that the polymerization should be conducted in the presence of a protective colloid. (Tr (Vanderhoff) 2818). In short, the product does not have the properties defined by claim 1. (Tr (Vanderhoff) 2816).

The basic differences between Chapman and the '388 patent are further apparent from the consideration that Chapman teaches that products having ethylene contents below 33%, such as the commercial products here at issue, are not adhesive. (Tr (Vanderhoff) 2817; TX 25, Col. 2, 11. 40-52; AX 907/907A). Accordingly, the Chapman patent does not anticipate; it leads the man skilled in the art away from the invention described and claimed in the '388 patent. (Tr (Vanderhoff) 2818-19).

(f) Lindemann And Volpe U.S. Patent Nos. 3,716,504 and 3,844,990

Two additional references relied on by the defendants are the Lindemann and Volpe '990 and '504 patents. (TX 12/12A, 11). Both the '990 and '504 patents disclose products which might have some adhesive properties, but the '990 patent is specific to paints and the '504 patent is specific to paper coatings. (Tr (Vanderhoff) 2819-20, 2826). Like the '851 patent, these patents grew out of the Airco research of the early 1960's. Neither patent contains any teachings in addition to those which were contained in the references which the examiner considered, particularly the '851 patent.

Neither of these patents teaches the polymerization of vinyl acetate and ethylene in the presence of a protective colloid, particularly PVOH. The examples of these patents teach the use of three or four surfactants. The '990 patent teaches that the amount of protective colloid added should be kept "at the lowest level possible." The '504 patent contains no teaching that protective colloids could or should be used. (Tr (Vanderhoff) 2821-29; TX 11-12; AX 907/907A). In sum, the '990 and '504 patents are, at best, merely cumulative of the teachings of the '851 patent; neither anticipates the invention at issue.

(g) The Jaffe Article

The Jaffe article relates to a presentation given by Mr. Harold L. Jaffe, then manager of the Coating Polymers Department of Airco, to the Adhesive and Sealant Council sometime in the early part of March 1966. (TX 13; Tr (Jaffe)560-62). The article itself is a "post print" of the Jaffe talk and contains subject matter not actually mentioned by Mr. Jaffe during his presentation. (Jaffe Dep. 304-06, 319).

The Jaffe article announces the introduction by Airco of a new product, Aircoflex 500, a product made by Airco before the invention of the '388 patent. The article discloses that the

Aircoflex 500 product is a vinyl acetate-ethylene copolymer useful in the formation of laminates in which one of the substrates is a difficult-to-bond surface, such as plastic film. The composition was described as containing approximately 25% ethylene, and as having a solids content of 53%. (Tr (Vanderhoff) 2830-32; Tr (Gaylord) 1810-11). The Jaffe article itself, however, is silent on the remainder of the composition's makeup.

The product, as the testimony showed, is the disclosed but unclaimed product of Example 9 of the patent-in-suit. (AX 903; Tr (Lindemann) 1535-36; Tr (Vanderhoff) 2832; Tr (Gaylord) 1934-35). Example 9, however, is not within the scope of the claims at issue here for a number of reasons. Not the least of these is that it employs surfactants rather than a protective colloid, and also, like the '851 patent, contains a termonomer, namely, triallyl cyanurate, as well as sodium vinyl sulfonate and maleic anhydride. (AX 903; Tr (Vanderhoff) 2829-32; Tr (Lindemann) 1535-36; Tr (Gaylord) 1934). Thus, neither the Aircoflex 500 product itself, nor the Jaffe article, anticipates the claimed '388 invention under any of the various subsections of 35 USC § 102.

(h) Roedel United States Patent No. 2,703,794

The last of the nine references is Roedel, United States Patent No. 2,703,794, issued March 8, 1955, based on an application filed September 4, 1951. (TX 14). Roedel discloses an ethylene-vinyl acetate polymer of general latex utility, such as for water-based paints, protective coatings and adhesives. (Tr (Vanderhoff) 2833; TX 14, Col. 5, 11.53-61). Roedel also discloses that the copolymers of the compositions described therein are in emulsion form and have from 25 to 90% by weight ethylene. (Tr. (Vanderhoff) 2834-35; Tr (Gaylord) 1813).

Roedel does not anticipate because the solids contents of his compositions, between about 7 to 24%, are too low; no

intrinsic viscosities are given for the polymer, and there is no disclosure of the use of protective colloids during the polymerization. (Tr (Vanderhoff) 2835-38). Moreover, since Roedel does not suggest the use of a protective colloid, it is necessarily silent as to any amount which is to be incorporated during the polymerization reaction. (Tr (Vanderhoff) 2837; AX 907/907A).

Roedel discloses three different types of processes: the batch addition of both the vinyl acetate and ethylene monomers; the batch addition of vinyl acetate and the semi-continuous addition of ethylene; and the semi-continuous addition of both vinyl acetate and ethylene. None of the processes includes the equilibration step which was used to produce the product of Example 8 of the '388 patent-in-suit. (Tr (Vanderhoff) 2834; AX 907/907A).

Finally, Roedel fails to disclose that the compositions described therein have the unique and novel combination of unexpected properties which were found for the composition of the '388 patent. (Tr (Vanderhoff) 2833-34; Tr (Gaylord) 1883-84). Accordingly, the Court finds that Roedel adds nothing to the prior art which the Patent Office examiner considered during the prosecution of the applications leading to the '388 patent-in-suit.

(i) The Secondary References Relied On By Defendants Are Cumulative To The Art Which The Patent Office Examiner Considered

Defendants also rely on an assortment of trade literature, handbooks and brochures which extol the virtues of PVOH for adhesive applications. (*See, e.g.*, TX 29-31, 37, 43). But none of those references involves ethylene copolymerizations. The prior art employing ethylene, for reasons discussed above, taught away from the use of PVOH. (Tr (Vanderhoff) 2801-03, 2807-09, 2813-14, 2818-19, 2821-28, 2833-38).

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In any event, the secondary references relied on by defendants are merely cumulative to United States Patent No. 3,301,809, issued January 31, 1967 to Goldberg, based on an application filed April 23, 1965. (TX 28). The Goldberg patent was considered by the Patent Office examiner during the '388 prosecution (AX 1-2).

Neither Goldberg nor the other references relied upon disclose or otherwise indicate that vinyl acetate-ethylene emulsions copolymerized in the presence of PVOH would have good heat resistance, good machining properties, good flexibility, high molecular weight, or any of the other characteristics which make the product of the '388 patent an outstanding laminating adhesive. (Tr (Vanderhoff) 2786, 2788, 2797-98, 2805, 2810, 2816, 2820, 2826, 2829, 2833-34; AX 907/907A; Tr (Erikson) 83-98, 102-03; AX AA; Tr (Gaylord) 1883-84).

From the foregoing, it is apparent that the defendants have cited no new references which add anything to the two most pertinent references, Worrall and the '851 patent, both of which were before the Patent Office. Taken together, those two references show: some adhesive properties, vinyl acetate-ethylene copolymerization, the batch vinyl acetate/semi-continuous ethylene with equilibration process, ethylene and solids contents within the claimed range and polymer intrinsic viscosity between 1 to 2.5. What they do not show is the combination of all the foregoing properties together with both copolymerization in the presence of a protective colloid, particularly PVOH, and the existence of the soluble fraction having the aforesaid intrinsic viscosity. Neither do they, nor any of the other references relied upon by defendants, disclose or suggest the combination of the six adhesive properties which Mr. Erikson testified were disclosed for the first time by the '388 patent. (Tr (Erikson) 102-03; Tr (Gaylord) 1883-84; AX AA, 907/907A). In short, defendants' additional references are merely cumulative to the references available to the Patent Office. The Court concludes, therefore, that defendants have

not overcome the presumption of validity; none of the references anticipates any of the eleven claims of the '388 patent.

7. The Invention Of The '388 Patent Was Not Obvious To A Person Of Ordinary Skill In The Art At The Time The Invention Was Made

As discussed in the preceding sections, the prior art which was available before 1967 when the '388 patent application was filed does not point in the direction of the '388 invention. On the contrary, as Dr. Vanderhoff carefully explained, the prior patents and applications teach away from the claimed adhesive compositions. (Tr (Vanderhoff) 2797, 2802-03, 2808-09, 2813-14, 2818-19, 2822-24, 2828-29, 2832-33, 2837-38, 2840-41; AX 907/907A).

For this reason, even if it is assumed that the level of ordinary skill in this art was very high, the substantial differences between the claimed invention and the prior art are such that the invention was not obvious.

On the obviousness issue, the defendants raise another argument. They contend that since at least one known laminating adhesive of the day, Daratak B, and various of the earlier homopolymer adhesives such as Vinac XX, employed PVOH, then it was obvious to use PVOH in the vinyl acetate-ethylene work. This argument fails for three basic reasons.

First, this is no more than an argument that it would have been "obvious to try" PVOH. But the law, as previously stated, is that "obvious to try" is not the appropriate legal test of the statute, 35 USC § 103. Second, it is by no means clear that it would have been obvious to try the combination of PVOH with a vinyl acetate-ethylene copolymer. Alone, PVOH had not remedied the cohesive strength problem as shown in the poor performance of Daratak B on this score. Third, in order to satisfy the obviousness requirements of the statute, the '388 products' properties would have to be obvious as well. The

evidence here is overwhelming that the properties of '388 adhesive were wholly unexpected. (Tr (Erikson) 83-84, 95; Tr (Vanderhoff) 2786, 2788, 2797-98, 2805, 2810, 2816, 2820, 2826, 2829, 2833-34; Tr (Gaylord) 1883-84; Tr (Lindemann) 1512-14; AX 751, p.470, 907/907A, AA).

The unexpected properties of the new adhesive composition and the long felt need for the ideal laminating adhesive, both discussed earlier in this opinion, were shown by the unrebutted testimony of Mr. Erikson. (Tr (Erikson) 78-79, 102-03; AX AA). The early work at Airco also supports these findings.

After several months of work and several unsuccessful experiments, the Example 8 product was first produced in an experimental run, P-335, on March 15, 1966. (TX 98-99, 105; AX 622, 707; Tr (Iacoviello) 2696, 2698-99). That product was tested for adhesive properties both by Mr. Iacoviello's group and by the full-scale adhesive testing laboratory headed by Mr. Rosenblum. Mr. Iacoviello's tests showed good peel strengths for some substrates, but gave meaningless results for vinyl, because of the atypical material used. (TX 148/AX 279, pp. 13, 38; Tr (Lindemann) 1522-25; Tr (Iacoviello) 2697-98, 2728-30; Iacoviello Dep. 51-57). The tests conducted in Mr. Rosenblum's group, however, immediately showed that the P-335 product had dramatically better peel strength, better aging characteristics and better plasticizer response than the commercial standard, Daratak B. (Tr (Lindemann) 1524-30; Tr (Iacoviello) 2698-99, 2734; AX 260/627, pp. 6 *et seq.*, 629; Rosenblum Dep. 23-24, 27-28; Blades Dep. 336-39; Iacoviello Dep. 342-43, 373-77).

When the P-335 product was scaled up for pilot plant production, tests on the resulting product, labeled "414-A5-F4," confirmed all the earlier results of the P-335 experiment. (AX 639; Iacoviello Dep. 423 *et seq.*). In addition to peel strength, aging characteristics, and plasticizer response, Mr. Rosenblum's group measured the new product's creep resis-

tance (cohesive strength). Again, the results were dramatically better than the industry standard, Daratak B. (AX 748, p. 113; Iacoviello Dep. 323-24). As a consequence of these new properties, the product was immediately accepted by the industry. (AX 642, 644, 748, p.113; Tr (Jaffe) 525-26; Iacoviello Dep. 323-24, 440-42, 447-49).

8. Commercial Success And Other Indicia Of Nonobviousness

The foregoing conclusion of nonobviousness is reinforced by recognized indicia of nonobviousness: (a) the product was an immediate and substantial commercial success; (b) there is evidence of acquiescence by others; and (c) defendants here copied the '388 adhesive composition rather than use any of the compositions of the prior art.

Mr. Harold L. Jaffe, the Airco executive in charge of marketing Airflex 400, testified to the commercial success of the product. Mr. Jaffe's comparison of the sales of Airflex 400 to the sales of other relevant products shows the dramatic commercial success of this new product.

As Mr. Jaffe pointed out, prior to the invention of the '388 patent, managers at Airco optimistically estimated that the market for any vinyl acetate-ethylene adhesive would level out at sales of not more than about 10 million pounds per year. (AX 880; Tr (Jaffe) 529). Yet sales of Airflex 400 were approximately 12 million pounds in 1968, about 23 million pounds in 1970 and almost 40 million pounds in 1973, a sales growth unprecedented in this field. (AX 879/879A; AX 785-86; Tr (Jaffe) 536).

Compared to sales of other vinyl acetate-ethylene copolymers marketed by Airco (between 4 and 12 million pounds), Airflex 400 is by far the greatest success (40 million pounds). (Tr (Jaffe) 523; AX 879A; AX 787-89). When the sales growth of Airflex 400 is compared to the sales growth of Air

Products' vinyl acetate homopolymer products (11% compounded in 1968-1973, about the same as the industry wide growth), Airflex 400 again was the far greater performer (50% compounded in those same years). (Tr (Jaffe) 532-33; AX 879/879A; AX 787-89).

The trial testimony establishes that the commercial success of Airflex 400 was due to the unexpected properties it exhibited. (Tr (Jaffe) 537). Mr. Erikson testified that when he received his first sample of the new product, he determined that it was the first product ever available to the adhesives industry which combined the six important properties long desired by that industry for a laminating adhesive. (Tr (Erikson) 78-79, 102-03; AX 654, AA). Mr. Myrick, a former employee of H.B. Stuck Adhesives, testified that Airflex 400 "made" Stuck Adhesives' Memphis, Tennessee plant; prior to the advent of Airflex 400, Stuck's customers had not been able to laminate vinyl successfully. (Tr (Myrick) 153-54, 158-60). Indeed, even CST declared in proceedings before the Patent Office that Airflex 400 had an enormous commercial impact on the adhesives industry, and that it was the largest selling polyvinyl alcohol-protected adhesive. (AX 3, pp. 24, 27, 37).

Further confirmation of nonobviousness is shown by acquiesence by others in the patent's validity. Mr. Jaffe testified that, in order to encourage sustained rapid growth in the market for Airflex 400, Air Products, at its customers' insistence, sought to find a second source of supply. (Jaffe Dep. 467-70). To that end, Air Products entered into negotiations with DuPont which culminated in DuPont's agreement to accept a license under the '388 patent and become a "second supplier." DuPont Agreed to royalty payments approximately eight times greater than its initial offer. (TX 217, 224, 225, 227, 238-39; Jaffe Dep. 394-97, 474-75, 492-93, 499-500; Wolfson Dep. 29-31, 42; Szanto Dep. 45-46, 54-55, 99-102).

DuPont agreed to these royalty terms even though it had previously obtained a draft opinion concluding that the '388

patent was invalid. Given this, this Court can only conclude that the draft opinion was prepared for negotiating purposes. DuPont itself apparently never gave its opinion any weight; indeed, the opinion was never formalized. (Wolfson Dep. 14, 22, 27-28; Szanto Dep. 69, 71-72, 107-09, 117-18; AX 840; *see* Jaffe Dep. 489-91; Ellis Dep. 47-61).

During its negotiations with Air Products, DuPont also raised arguments with respect to alleged grounds for avoiding infringement. Among other things, DuPont argued that the addition of an unnamed third monomer avoided infringement. Yet DuPont agreed to the payment of royalties despite the existence of these purported "non-infringement" arguments. (AX 733; TX 219, 223-26, 230, 262; Jaffe Dep. 464-67, 483-85, 488-90; Rosenblum Dep. 79-81; Wolfson Dep. 33-34, 37, 40-48; Szanto Dep. 31-33, 41-44, 49-53, 98).

Long before its purchase of CST, National Starch obtained an opinion that the '388 patent was invalid, but nevertheless entered into licensing negotiations with Air Products to obtain a license under the '388 patent. (TX 263-64). National Starch chose not to take a license and did not manufacture vinyl acetate-ethylene copolymer emulsion products covered by the '388 patent until it acquired CST. (Tr (Nadler) 1613-16). The Court accordingly gives no weight to the National Starch invalidity opinion.

The remaining indicia of nonobviousness is defendants' copying of plaintiff's patented product. That copying is detailed in the infringement section of this opinion.

C. Defendants' Other Defenses

The defendants have raised a number of other defenses in an attempt to defeat the '388 patent. The Court will take these up separately.

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1. The § 112 Defense

Defendants argue that Messrs. Lindemann and Iacoviello failed to satisfy the disclosure requirements of 35 USC § 112, and in particular that they failed to disclose the best mode known to them for carrying out their invention. Section 112 requires that the patent specification contain a written description sufficient to teach one skilled in the art how to practice the invention. It also requires that an inventor set forth the "best mode contemplated by the inventor" for carrying out his invention at the time the application is filed. What constitutes the "best" mode is to be judged by the inventors, and it is settled that the "best mode" need not be the actual commercial mode ultimately employed. *In re Gay,* 309 F.2d 769, 773 (CCPA 1962).

Defendants' argument appears to be that the inventors were charged with the duty of disclosing to the Patent Office the reaction control apparatus and agitation system of the 500 gallon semi-works reactor used by Airco in scaling up the Example 8 composition for pilot plant production. They argue that the scaled-up reactor produced a better product than the experimental Example 8 product. Defendants' best mode argument fails for the following reasons.

As Mr. Iacoviello testified, he felt that the best way for carrying out the invention of the '388 patent was his bench-scale procedure described in Example 8. (Tr (Iacoviello) 2696, 2702-06, 2721, 2738). That procedure produced the best product and it was the safest way to conduct the polymerization. (*Id.*). It is also telling on this issue that Mr. Lindemann, defendants' own expert, gave no testimony in support of the defendants' best mode defense.

The evidence of record also fails to show that the inventors ever had any personal knowledge of the details of the reaction control apparatus and system associated with the 500-gallon semi-works reactor, or that they had any knowledge as to the

details of the agitation apparatus of that reactor. (Tr (Iacoviello) 2709).

The Court has considered defendants' other so-called best mode objections and found them meritless. The specification is directed to a person skilled in the art; he would know precisely how to carry out the process of Example 8 to get the product there described. (Tr (Vanderhoff) 256-59, 351-57; Iacoviello Dep. 544-47, 682-84).

Accordingly, the Court finds that the inventors of the '388 patent satisfied the requirements of 35 USC § 112.

2. Defendants' Fraud Contentions

Defendants have charged plaintiff Air Products and its predecessor in interest, Airco, with fraud in the prosecution of the '388 patent. Defendants allege that Airco and Air Products failed to disclose to the Patent Office certain prior art materials, in particular the German application, the French patent and information concerning Daratak B and Gelva TS-100. They charge that plaintiff's attorney mischaracterized the Worrall '322 patent when he himself brought it to the Office's attention. And they charge that Airco and Air Products falsified or misrepresented the data set out in Table 1 for Example 8, the write-up of which is that of Run P-335. (*See* Tr (Iacoviello) 2737-39).

The allegation of fraud on the Patent Office is a serious charge and the courts have demanded a substantial quantum of proof to establish the claim. *Norton* v. *Curtiss*, 433 F.2d 779, 797 (CCPA 1970); *Oetiker* v. *Jurid Werke GmbH*, 671 F.2d 596, 600 (D.C. Cir. 1982); *Tate Engineering, Inc.* v. *United States*, 477 F.2d 1336, 1345 (Ct. Cl. 1973). The defendants, asserting fraud, carry a heavy burden of persuasion. *Krenzer* v. *Stoffel*, 551 F.2d 1214, 1217 (CCPA 1977). Clear proof of "specific intent" that Airco or Air Products "knowingly and willfully" misrepresented facts to the Patent Office is also

required to establish a charge of fraud. *Oetiker*, 671 F.2d at 600.

In general, a finding of fraud requires proof of two specific elements: (1) proof that information was, with bad faith intent, withheld from or misrepresented to the Patent Office during the prosecution of the patent; and (2) proof that the misrepresentation or omission was material to the prosecution of the patent, *e.g.*, proof that the allowance of the patent was the result of such bad faith conduct. *Norton* v. *Curtiss*, 433 F.2d at 793; *4MI Industries, Inc.* v. *E.A. Industries, Inc.*, 204 USPQ 568, 589 (W.D.N.C. 1979), *aff'd*, 644 F.2d 876 (4th Cir. 1981). Absent proof of each of these elements, no fraud can be found.

(a) The Alleged Fraudulent Failure To Cite Prior Art

With regard to the charge that a reference was fraudulently withheld, the proof must, as a minimum, establish that the reference is more relevant to the claimed invention than was the art considered by the Patent Office, and that the failure to disclose that reference to the Patent Office was deliberate and intentional, together with proof that such bad faith conduct was material to the allowance of the patent. *Plasser American Corp.* v. *Canron, Inc.*, 546 F. Supp. 589, 603 (D.S.C. 1980); *Feed Service Corporation* v. *Kent Feeds, Inc.*, 528 F.2d 756, 762-63 (7th Cir. 1976); *General Battery Corp.* v. *Gould, Inc.*, 545 F.Supp. 731, 740 (D. Del. 1982); *Solvex Corp.* v. *Freeman*, 199 USPQ 797, 800 (W.D. Va. 1976); *Kelley Manufacturing Co.* v. *Lilliston Corp.*, 200 USPQ 670, 692 (E.D.N.C. 1978), *aff'd*, 636 F.2d 919 (4th Cir. 1980).

The testimony in this case shows that Mr. Lindemann and Mr. Stewart, the Airco patent attorney responsible for drafting the application, knew of the French and German references relied on by defendants. (TX 89). But from Mr. Stewart's testimony it is clear that he did not believe that the German

'085 application (TX 3, 3A, 9) or the French patent (TX 6B, 7) were pertinent to the subject matter claimed in the application either when it was originally filed on March 13, 1967 or when it issued. (Stewart Dep. 135-38, 183-86, 243-44, 264-68, 297-98, 302-03; *cf.* Stewart Dep. 26-27; TX 250-51).

In the one instance where Mr. Stewart did consider the German application relevant, in connection with the first process patent application filed by Airco, he did bring it to the Patent Office's attention. (TX 19, 74A; Stewart Dep. 73-76, 196-97, 243-44, 265-66, 297-98, 302-03). Mr. Stewart's contemporaneous belief that these patents were not relevant or material prior art was confirmed at trial by Dr. Vanderhoff's testimony. (Tr (Vanderhoff) 2778-2803; AX 907/907A). The German application and the French patent are at best merely cumulative to the art which was of record during the '388 prosecution. Defendants' expert, Mr. Modance, agreed that cumulative art need not be cited to the Patent Office. (Tr (Modance) 2572).

Defendants point to an early Airco report (TX 67, 79), which states that a composition of matter claim probably could not be obtained because of the German application. As both Mr. Lindemann and Mr. Modance admitted at trial, however, that document was dated well over two years before the claimed invention was made. (Tr (Lindemann) 1441-45; Tr (Modance) 2541-43).

Defendants also argue that the German application was the "jumping-off" point for Airco's entire vinyl acetate-ethylene program, and therefore should have been cited. (TX 62, 64-66, 89; Blades Dep. 130-31; Stewart Dep. 188-95). But that starting point was two and one half years before the invention of the '388 patent was made. By that time, the German reference had become irrelevant in view of the substantial progress made by Mr. Lindemann and his co-workers as reflected by the '851 patent, which was considered by the

examiner. (Tr (Lindemann) 1441-45; Tr (Modance) 2541-43).

Defendants also point to the citation of the German application and French patent during the prosecution of certain foreign patent applications based on the application for the '388 patent. (AX 756; TX 287-98; Ellis Dep. 185 *et seq.;* Stewart Dep. 283-90). The claims against which the foreign patent authorities cited these patents do not appear in the record; that failing, together with the difference in legal standards which may pertain, of which defendants have adduced no proof, prevents the Court from finding any fault with the failure to cite these references.

In any event, Dr. Vanderhoff established at trial that these two references, like the other prior art relied upon, actually teach away from the claimed invention. (Tr (Vanderhoff) 2795-97, 2802-03). There is no "fraud" where arguments favorable to patentability might be but are not made to the examiner.

Furthermore, defendants adduced no proof of any deliberate intent to withhold any information from the Patent Office, by either the inventors or by their counsel, Mr. Stewart or Mr. Ellis. Nor is there any evidence that counsel or the inventors were guilty of gross negligence for failing to cite any materials.

(b) Defendants' Contention That Plaintiff Committed Fraud By "Mischaracterizing" The Worrall Reference

Defendants further maintain that Mr. Ellis, who took over the prosecution of the patent application upon Air Products' purchase of the business from Airco, committed fraud by mischaracterizing the Worrall reference. Since the reference was made available to the Patent Office examiner, thus permitting the examiner to study and consider the reference and make his own independent determination as to the accuracy of the applicants' arguments, it is difficult to understand defend-

ants' fraud charges. *See Skil Corp.* v. *Lucerne Products, Inc.*, 489 F.Supp. 1129, 1161 (N.D. Ohio 1980), *aff'd*, 684 F.2d 346 (6th Cir. 1982). The examiner had the patent before him, he is assumed to understand it, and he presumably read it after it was brought to his attention. Furthermore, as this Court has already found, Worrall's products are not taught as possessing utility as laminating adhesives. Consequently Mr. Ellis's statement that the products do not possess such properties cannot be fraud. Moreover, defendants have shown no intent to mislead the examiner. (TX 47, 48; Ellis Dep. 31-37, 245-47).

(c) Defendants' Allegation Of Fraud In Connection With Certain Data Set Forth In Table I

Defendants also charge fraud concerning Example 8 and the peel strength data set out in Table 1. It is settled law, however, that all patent applicants are entitled to make, and are expected to make, a good faith judgment as to what test results are pertinent and require disclosure. *Nelson* v. *Bowler*, 626 F.2d 853, 858 (CCPA 1980); *Special Metals Corp.* v. *Teledyne Industries, Inc.*, 215 USPQ 698, 707 (W.D.N.C. 1982); *Mobil Oil* v. *Filtrol Corp.*, 186 USPQ 252, 260 (C.D. Cal. 1975); *Rohm & Haas* v. *Owens-Corning Fiberglas Corp.*, 196 USPQ 726, 739 (N.D. Ala. 1977). In other words, the applicant is obligated to present to the Office only those test results that fairly and accurately represent the true scientific facts. *Special Metals Corp.*, 215 USPQ at 705-06; *General Battery Corp.*, 215 USPQ at 1028.

The testimony shows that the source of the data reported in Table 1 for Example 8 is the series of tests run by Messrs. Iacoviello and Rosenblum in 1966. Most of the data in Table 1 came from Mr. Iacoviello's original peel tests, which were run at a peel rate of 5″ per minute as reported in the patent. In some instances, however, Mr. Rosenblum's data was used because Mr. Iacoviello's tests had given meaningless results. (Iacoviello Dep. 51-57, 314, 364-71). That was the case for the

Example 8 peel strength for vinyl film. Mr. Iacoviello's tests with his atypical vinyl had shown essentially no peel strength (*i.e.* "less than 0.1") for the PVOH-protected products he tested, P-335 and Daratak B, the latter being the commercial bench mark of the time. Mr. Iacoviello's own contemporaneous report confirms that the data was insignificant. (AX 279, pp. 13, 38; Tr (Iacoviello) 2697-98, 2704-06, 2728-31; Tr (Lindemann) 1522-25; Iacoviello Dep. 120-23, 300-01, 303-09, 456 *et seq.*, 517 *et seq;* Stewart Dep. 204-11, 217, 229-32, 234-35, 272-75, 308, 309-10, 315-16; Ellis Dep. 23-24, 26-27).

Mr. Iacoviello and Mr. Stewart consequently used the representative data obtained by Mr. Rosenblum for both the original P-335 product and the same product produced on a larger scale in the 500 gallon reactor, Run 414-A5-F4. Mr. Rosenblum's tests had been run at peel rates of 2″ per minute and 20″ per minute. For 2″ per minute, he obtained values of 3.0 (unplasticized product) and 3.5 (plasticized product) for the original P-335 product, and values of 3.8 (unplasticized) and 4.0 (plasticized) for the scaled-up run. For the 20″ per minute tests, he obtained values of 5.5 for both the unplasticized and plasticized original P-335 product and 6.0 for both the unplasticized and plasticized scaled-up product. (AX 627-29, 639). These results are in accord with the general rule that as the peel rate increases, the measured peel strength also increases. (Tr (Lindemann) 1528-29; Tr (Modance) 2594-95).

In order to arrive at representative values for Example 8 at the 5″ per minute rate, which was used for the other data in Table 1 of the '388 patent, the higher of the 2″ per minute results were used. Because the 5″ per minute values would, if anything, have been higher than the 2″ per minute values, this choice is entirely appropriate or even somewhat conservative. In summary, the data set forth in Table 1 is a fair and accurate representation of the properties of the Example 8 product. (Tr (Iacoviello) 2704-06, 2721, 2724-25, 2738-39; Stewart Dep.

236, 272-75, 308-10, 315-16; Jaffe Dep. 379-82; AX 662, 665; Rosenblum Dep. 63-64, 92-94; Blades Dep. 345-47).

To the extent defendants contend that it was inappropriate to use the data from the scaled-up rather than the laboratory scale product, their arguments are unsound. The testimony of defendants' expert, Dr. Gaylord, is itself dispositive of this fraud issue; he admitted that the differences in procedures for the original and scaled-up runs would not have produced any significantly different results in peel, *i.e.* adhesive, strength. (Tr (Gaylord) 1831-32). Consequently, as to peel strength, there could have been no misrepresentations. As to cohesive strength, if there were any differences, the original P-335 product was, if anything, better than the scaled-up 414-A5-F4 product. P-335 had higher benzene insolubles; those higher insolubles mean that the P-335 product had higher creep resistance, and there is no dispute that the correct insolubles were reported for Example 8. (Tr (Gaylord) 1831-32; Tr (Iacoviello) 2740-41; Tr (Lindemann) 1497-98; Rosenblum Dep. 50-56).

Defendants have also raised questions about the cellulose acetate data reported in Table 1 for Example 8. The cellulose acetate use has never been an issue in this lawsuit or in the Patent Office prosecution. Moreover, all of that data was supplied to Mr. Stewart by defendants' own expert, Mr. Lindemann. The cellulose acetate data used for Example 8 in Table I was obtained from Table III of a memo sent by Mr. Lindemann to Mr. Stewart in October of 1966. (TX 175). The data, then, is data obtained in actual experiments and there has been no showing that it was used in any way whatsoever to mislead the Patent Office.

In summary, since defendants failed to prove any of the elements required to substantiate their charges of fraud, on any of the grounds alleged, the Court accordingly finds that there was no fraud committed in the prosecution of the '388 patent.

D. The Court Concludes That The '388 Patent Is Good And Valid In Law

For the foregoing reasons, the Court finds that the defendants have not satisfied their burden of rebutting the presumption of validity which attaches to the '388 patent and all its claims, even by a preponderance of the evidence. The presumption therefore stands and, having considered all the evidence, the Court finds the patent and its eleven claims are valid.

IV. PATENT INFRINGEMENT

Plaintiff's charges of infringement are the following:

a. Defendants have directly infringed claims 1 through 3 of the '388 patent by making and selling four adhesive products, Dur-O-Set E-200, E-216, E-220 and E-230.

b. Defendants have directly infringed claims 4 through 11 of the '388 patent by making and using laminated articles using the same four adhesive products.

c. Defendants have induced infringement of claims 1 through 6 and 8 through 10 by inducing their customers to make laminates using defendants' E-200, E-216, E-220 and E-230 products.

The Court finds in favor of the plaintiff on each of these three issues for the reasons set forth below.

A. Defendants Directly Infringe Claim 1

Plaintiff's first charge, direct infringement, may be proven by showing either: (1) that defendants' products literally fall within the scope of the claims; or (2) to the extent they are not literally within the scope of the claims, they are equivalent to the claimed composition. In considering literal infringement,

"resort must be had in the first instance to the words of the claim." If accused matter "falls clearly within the claim, infringement is made out and that is the end of it." *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, 339 US 605, 607 (1950); *International Nickel Co.* v. *United States*, 175 USPQ 209, 215 (Ct Cl. 1972); *Ziegler* v. *Phillips Petroleum Co.*, 483 F.2d 858, 868 (5th Cir. 1973).

Under the doctrine of equivalents, a patent claim is infringed if the accused product performs substantially the same function in substantially the same way to obtain substantially the same result. *Graver Tank & Mfg.*, 339 US at 608; *Autogiro Co* v. *United States*, 384 F.2d 391, 400 (Ct. Cl. 1967). Under this doctrine, an accused infringer cannot avoid infringement by making minor changes in the accused product, process, or article of manufacture. *Ziegler*, 483 F.2d at 868; *Plasser American Corp.*, 546 F.Supp. at 604.

Plaintiff has proved both literal infringement and infringement under the doctrine of equivalents.

1. Defendants' E-200 Product Directly Infringes Claim 1 Of The '388 Patent

The origins of the defendants' E-200 and the related "E" series products go back to 1970. By that time Mr. Lindemann had left the employ of Airco and was Vice President of Research and Development for defendant Chas. S. Tanner. (Tr (Lindemann) 606-07, 1157).

While the '388 patent had not at that time been issued in the United States, Mr. Lindemann knew that corresponding foreign applications had been filed and published in various foreign countries. He obtained a copy of the Dutch equivalent, translated Example 8 into English, the same example corresponding to plaintiff's commercial Airflex 400 product, and used that example for the first experimental work at CST. (Tr (Lindemann) 608-09, 1385-86; Tr (Wacome) 449-50; AX 11; AX 13; Tr (Iacoviello) 2696; Tr (Cordeiro) 708-10).

Mr. Lindemann instructed one of his research chemists, Mr. Donald Wacome, to reproduce the Example 8 adhesive composition. (Tr (Lindemann) 608-09, 1385-86; Tr (Wacome) 449-50; AX 11, 13). Mr. Wacome was immediately successful. (Tr (Wacome) 456). This experiment then led to subsequent reproductions, all of which were designed to produce a product which could compete in the market with plaintiff's Airflex 400. (Tr (Wacome) 457-62; AX 53, pp. 61, 63; AX 57-58; AX 59, pp. 4, 15, 17, 27, 29, 31; AX 73; AX 507; *see* AX 111; Sembert Dep. 93-97).

CST's initial commercial efforts in the vinyl acetate-ethylene field were directed to the manufacture of copolymers useful in the textile, rather than the adhesives industry. By 1975, however, after CST had been acquired from its original owners by the Ciba-Geigy Corporation, defendant CST committed itself to the commercial manufacture of the Airflex 400-type product. (AX 70). After purchasing and installing the necessary commercial equipment, CST commenced manufacture of its new product, called "E-200", in the fall of 1977. (AX 768, pp. 12-13).

In September or October of 1978, Mr. Blakely, then President of defendant CST, and Mr. Lindemann attempted to sell E-200 to the Borden Company, one of plaintiff's major customers for Airflex 400. Messrs. Blakely and Lindemann told Mr. Erikson, who was then responsible for adhesives at Borden, that E-200 was equivalent to Airflex 400 and that the E-200 product could be directly substituted for plaintiff's product. Neither Mr. Blakely nor Mr. Lindemann suggested to Mr. Erikson that E-200 was any better than, or different from, Airflex 400. (Tr (Erikson) 105-07).

At about this same time, defendant CST also sold E-200 to Mr. Larry Myrick of Universal Adhesives in Memphis, Tennessee, as a direct replacement for Airflex 400. Mr. Myrick's company used E-200 as a replacement for Airflex 400 and, in fact, after purchasing some of the E-200 product, Mr. Myrick

placed it in the same storage tank he was then using for Airflex 400. (Tr (Myrick) 153-54, 162-63, 165, 169).

The evidence at trial also showed that defendant CST told Mr. William Donaldson, the Executive Vice President and Chief Operating Officer of Southeastern Adhesives, that E-200 was a direct replacement for Airflex 400. (Tr (Donaldson) 175, 179-81). Defendant CST never stated or suggested that E-200 was any different from Airflex 400. (Tr (Donaldson) 181).

Even the defendant National Starch, who purchased CST only July 31, 1980 (Defendant's Answer, ¶ 3), evaluated the E-200 product and found it comparable to Airflex 400. (TX 564-66; Tr (Nadler) 1614-15, 1619-21, 1657-67, 1670, 1688 *et seq.*, 1694-95).

(a) Chemical Analyses Of The E-200 Product Establish Infringement

Prior to the commencement of this action, both the plaintiff, Air Products, and its licensee, DuPont, independently analyzed defendant CST's E-200 product; both concluded it infringed the claims of the '388 patent. Plaintiff concluded that E-200 is a vinyl acetate-ethylene emulsion copolymer, having almost the same performance properties as Airflex 400. (AX 680, 724, 725; Tr (Vanderhoff) 343-44; Rosenblum Dep. 70-75, 82-89).

The DuPont report concluded that:

> We have obtained three separate samples of the acetate/ethylene emulsion produced by Tanner that clearly

place his product within Claim 1 of the subject patent. The data is summarized below.

	U.S. 3,708,388	CST
Copolymer, % ethylene	5-40	17.2
Emulsion, % solids	45-60	56.4
Intrinsic viscosity, dl/g (in benzene, 30°C)	1-2.5	1.18*
Protective colloid, %	0.05-2.0	1.66
Type of protective colloid	PVA &/or HEC	PVA

* This value is the average of three samples obtained from three separate sources and which we are assured are products from Charles S. Tanner. Intrinsic viscosity values of 1.02, 1.17 and 1.34 were obtained by acetone extraction. (AX 726; *see* TX 240, 243-44; Wolfson Dep. 50-54).

Analyses conducted by Air Products subsequent to the commencement of this action further confirm and support the Court's findings that defendants' E-200 product (as well as defendants' E-216, E-220 and E-230 products) infringes the claims of the '388 patent. (AX 752).

The evidence adduced at trial showed that the Borden Company received samples of defendants' E-200 product in the fall of 1978. (Tr (Erikson) 105-08). Borden tested the E-200 samples and determined that there were no significant differences between E-200 and Airflex 400. (Tr (Erikson) 107-08).

(b) Defendants' Records Show That Their E-200 Product Is Within The Scope Of Claim 1

Plaintiff's expert, Dr. Vanderhoff, studied defendants' internal records and provided the Court with summaries which were unchallenged. (AX 220, 566-82; Tr (Vanderhoff) 275-81). At the outset, the Court finds that, in accordance with Dr. Vanderhoff's testimony, the process used by defendants is the same as the process disclosed by plaintiff in Example 8 of the patent; in other words, defendants employ (1) a batch vinyl acetate, semi-continuous ethylene process; (2) an equilibration period; (3) a redox catalyst system; and (4) copolymerization in the presence of PVOH. That process leads to the product of Example 8. (Tr (Vanderhoff) 345-47, 351-57; AX 212, 582, 857; Schwirian Dep. 775).

Defendants' formulation sheets show that E-200 is an adhesive composition that consists essentially of an aqueous vinyl acetate-ethylene copolymer emulsion as required by claim 1. (AX 566-70; Tr (Vanderhoff) 282-83, 297-99; Tr (Lindemann) 608; AX 160). On this point, there seems to have been little, if any, dispute between the parties.

Dr. Vanderhoff reviewed 672 runs of the E-200 product. The average ethylene content was 17%, thus placing the E-200 product squarely within the scope of claim 1. There were two anomalous runs outside the claims containing 3% and 4% ethylene. (Tr (Vanderhoff) 282-83; AX 220; *see* AX 580, p. 2, Runs SG 205 and SG 222).

The solids contents for nearly all of the 672 E-200 runs were reported. All were very close to 55% solids, well within the claimed range of 45 to 60% of claim 1. (AX 220, 574-76, 580-81; Tr (Vanderhoff) 283-84).

The intrinsic viscosity measurements determined for the products fell in the range of 0.47 to 1.47, the average intrinsic viscosity being 0.92. Of these, all except one were inside the range specified in claim 1. (Tr (Vanderhoff) 284; AX 220; AX

580, p. 8, Run SL 216). The claimed range is "1 to 2.5." Scientifically, because the number "1" is stated to only one significant figure, as opposed to 1.0, it includes values between 0.51 and 1.49; consequently all the intrinsic viscosity values except the anomalous 0.47 value are within the claim. (Tr (Vanderhoff) 273, 437-38). This conclusion is borne out by the Patent Office proceedings. Both the applicants' attorney and the Patent Office examiner considered the intrinsic viscosity limitation to include Example 8, which has an intrinsic viscosity of .83. (AX 2, pp. 120-21; Tr (Vanderhoff) 215-16, 273; Tr (Witherspoon) 1069-70).

In an attempt to exclude some of the E-200 runs, defendants contend that the claimed lower limit of "1" should be interpreted as 1.0. While the Court rejects this argument in view of Dr. Vanderhoff's testimony, even if the claimed range were so interpreted, the intrinsic viscosities of these products infringe under the doctrine of equivalents. The defendants themselves have established that equivalency by selling products having instrinsic viscosities above and below 1.0 as the same product (AX 220,580), and defendants have offered no evidence that there are any consequential differences. On the contrary, plaintiff's expert, Dr. Vanderhoff, testified that the intrinsic viscosities of all of these products showed they contained soluble copolymer of high molecular weight. (Tr (Vanderhoff) 216, 300-01).

All of the formulation data provided shows the protective colloid was PVOH. (Tr (Vanderhoff) 284-86; AX 566-70, 580-81). The average concentration of PVOH was 2.10%, and the range was from 1.17% to 2.36%. (Tr (Vanderhoff) 285). Accordingly, the Court finds that all of these runs satisfy this limitation of claim 1. The upper end of the claimed range for protective colloid is "about 2," clearly embracing, literally, any concentration less than 2.5 under the proper scientific interpretation. (Tr (Vanderhoff) 301-02). The Court therefore

concludes that defendants' products literally meet this limitation and also infringe under the doctrine of equivalents.

Accordingly, the Court concludes that all of defendants' E-200 products except the anomalous products of Runs SG 205, SG 222 and SL 216, infringe claim 1 of the '388 patent both literally and under the doctrine of equivalents.

2. Defendants' E-216 Product Infringes Claim 1 Of The '388 Patent

The E-216 product, which was manufactured by National Starch for its internal use after the acquisition of CST, is the full equivalent of E-200 with no more than a new label. (Tr (Nadler) 1615-17, 1688; Tr (Schwirian) 2058).

The defendants' E-216 formulation sheets were also studied and summarized at trial. The results show that the E-216 product is well within the scope of claim 1. (Tr (Vanderhoff) 286-87; AX 571, 577, 580-82).

All the E-216 products were produced by the copolymerization of the ethylene and vinyl acetate monomers in the presence of a protective colloid, in particular, PVOH. The average concentration of protective colloid present during the polymerization was 2.10%. (Tr (Vanderhoff) 287, 290-91, 297-99; AX 571, 580-81). The solids contents of the E-216 products were all about 55%. (Tr (Vanderhoff) 290; AX 577, 580-81). The glass transition temperatures for the E-216 products correspond to an ethylene content in the range from 11 to 16%, with the average corresponding to about 13% ethylene. (Tr (Vanderhoff) 287-89, 298-99, AX 577, 580-81; *see* Tr (Vanderhoff) 219-27; AX 806, 839).

While no intrinsic viscosity data were provided by the defendants for the E-216 product, Dr. Vanderhoff testified that the conditions of the polymerization and the formulations used for E-216 (AX 218, 571) would result in an intrinsic viscosity comparable to that for E-200. (Tr (Vanderhoff) 290). De-

fendants, who make and use E-216 internally, offered no evidence in rebuttal to Dr. Vanderhoff's testimony on this point, and the Court accepts Dr. Vanderhoff's statements. Nor was any contention made that the E-200 and E-216 products differ with respect to intrinsic viscosity. Indeed, Mr. Nadler of National Starch testified that E-216 was the same as E-200 except for removal of one of two surfactant-like materials. (Tr (Nadler) 1615-17, 1688). The evidence therefore establishes to this Court's satisfaction that the E-216 products infringe claim 1 both literally and under the doctrine of equivalents. (Tr (Witherspoon) 1086).

3. Defendants' E-220 Product Infringes Claim 1 Of The '388 Patent

Defendants' E-220 product is also an adhesive consisting essentially of an aqueous vinyl acetate-ethylene copolymer emulsion. It is essentially the same product as E-200, and is made by the same process. (Tr (Vanderhoff) 291-92, 297-99, 352-57; AX 131, p. 1; AX 143, p. 2; AX 221; AX 572; AX 753, pp. 13, 15).

Again, defendants' own internal data confirms the infringement. The protective colloid used in the manufacture of the E-220 product was PVOH. It was employed in concentrations ranging from 2.05 to 2.17%; the average concentration was 2.10%. The E-220 product, therefore, contains the requisite amount and type of protective colloid to satisfy the limitations of claim 1. (Tr (Vanderhoff) 292; AX 572, 580-81). The E-220 products all had solids contents close to 55%. (Tr (Vanderhoff) 291-92; AX 220, 572, 578, 580-81). The average ethylene content measured was 18.5%, the range being from 11 to 41%. (Tr (Vanderhoff) 292; AX 220, 580-81). Since the upper limitation of the ethylene range specified in claim 1 is "to about 40%", all of these products fall within the range of the claim. Where intrinsic viscosity data was generated, the average value was exactly the same as the '388 patent's

Example 8, 0.83; the range of values was from 0.60 to 1.21. (Tr (Vanderhoff) 292; AX 220, 580-81). The evidence establishes, and the Court therefore finds, that defendants' E-220 products infringe claim 1 both literally and under the doctrine of equivalents. (Tr (Witherspoon) 1086).

4. Defendants' E-230 Product Infringes Claim 1 Of The '388 Patent

Defendants' E-230 product is also an adhesive consisting essentially of a vinyl acetate-ethylene copolymer emulsion. (AX 573, 753, pp. 13, 15; Tr (Vanderhoff) 292-94, 297-99). The product is essentially the same as E-200 except that it has a higher ethylene content and is therefore slightly "softer." The ethylene content, however, is still within the range of claim 1. (Tr (Vanderhoff) 297-99).

Defendants' data for E-230 show the solids contents for all the E-230 products were close to 55%. (Tr (Vanderhoff) 294; AX 220, 579-81). The average ethylene content of the E-230 product, to the extent measured, was 29%. (Tr (Vanderhoff) 293-94, 297-98; AX 220, 580-81).

The intrinsic viscosity data available (6 values) showed a range of 0.45 to 1.07, the average value being 0.59 (Tr (Vanderhoff) 438-39; AX 220, 580-81). Half the values were within the claimed range, either literally or under the doctrine of equivalents. (Tr (Vanderhoff) 439). The E-230 products were copolymerized in the presence of a protective colloid, namely, PVOH, and the average concentration of the protective colloid was 1.97%, ranging from 1.85% to 2.43%. (Tr (Vanderhoff) 293; AX 573, 580-81). The Court therefore finds that with the exception of the three anomalous runs having intrinsic viscosities below .50, the E-230 products infringe claim 1. (Tr (Witherspoon) 1086).

B. Defendants Also Directly Infringe Claims 2-11

Claim 2 of the '388 patent-in-suit, which is dependent on claim 1, limits the protective colloid of claim 1 to a partially acetylated polyvinyl alcohol. (AX 1, Col. 16, 11. 5-6). All of defendants' E-200, E-216, E-220 and E-230 products were manufactured with commercial grades of partially acetylated polyvinyl alcohol. (Tr (Vanderhoff) 345-47; AX 160, 566-73). Accordingly, defendants have directly infringed claim 2 of the '388 patent by virtue of their manufacture and sale of E-200, E-216, E-220 and E-230.

Claim 3 of the patent-in-suit also depends from claim 1, and requires that the ethylene content of the copolymer be more than 15% by weight. (AX 1, Col. 16, 11. 7-9). The Court has previously found that the average ethylene contents of the E-200, E-220 and E-230 products are, respectively, 17%, 18.5% and 29%. These products therefore also infringe claim 3 of the '388 patent. (Tr (Vanderhoff) 347-50). The E-216 product, however, has an average ethylene content of 13% and, while it infringes claim 1 of the patent, it does not infringe this narrower, dependent claim. (Tr (Vanderhoff) 348-49).

Defendants also directly infringed claims 4-11. They carried out the process of claims 4-7 and manufactured the laminates of claims 8-11 by using E-200 and other products. (Tr (Devine) 494-500; AX 283-84).

C. Defendants Also Induced Others To Infringe Claims 1-6 And 8-10 Of The '388 Patent

Under the United States patent statutes, a patent owner has the right to enforce his patent rights against those who induce infringement as well as against direct infringers. Active inducement exists where one purposefully causes, urges or encourages another to infringe. 35 USC § 271; *Honeywell, Inc.* v. *Metz Apparatewerke,* 509 F.2d 1137, 1142 (7th Cir. 1975); *Noll* v. *O.M. Scott & Sons Company,* 467 F.2d 295, 300 n.3 (6th

Cir. 1972). The Court concludes that defendants actively induced the infringement of claims 1-6 and 8-10, by urging and encouraging its customers to use the patented adhesive in laminating applications.

Defendants induced the infringement of claims 1-3 by actively encouraging their customers to use the E-200 product as a replacement for Airflex 400 and Elvace 1875, knowing that such use would take place, as it in fact did, within the United States. Specifically, the evidence at trial establishes that the defendants induced Taylor Chemical of Hickory, North Carolina; Southeastern Adhesives of Lenoir, North Carolina; DeCor of Elkhart, Indiana; and Universal Adhesives, Inc. of Memphis, Tennessee, among others, to use the E-200 products in making adhesive formulations in their United States plants. (Tr (Devine) 491-94; Tr (Myrick) 153-56, 165, 171; Tr (Donaldson) 173-75, 178-84; AX 753, pp. 20-35; AX 754, pp. 13-28).

The evidence also shows that defendants induced the infringement by others of claims 4-6 and 8-10 of the patent-in-suit. Claims 4-6 relate to a process for making a laminate by using the compositions of claims 1-3. Claims 8-10 recite the resulting laminate. Mr. Devine, an employee of CST, actively encouraged such use and assisted customers in preparing laminating adhesive formulations which incorporated the defendants' products, knowing full well that such products would be used, as they in fact were, in laminating vinyl webs to particle board, as well as to other substrates. (Tr (Devine) 491-500; Tr (Myrick) 155-66, 171; Tr (Donaldson) 174-77, 184).

Defendant CST in fact purchased coating and laminating equipment like that used by its customers in order to further assist, and thereby induce, its customers to use the E-200 product in the process of making laminates from a continuous web, such as vinyl film, with full knowledge that the resulting laminates would be used and sold in the United States. (Tr

(Devine) 494-500; Sembert Dep. 247-54; AX 165, 283-84, 531).

Accordingly, the Court concludes that the defendants are liable for inducing infringement of claims 1-3 due to the use by defendants' customers of the E-200, E-216, E-220 and E-230 products. The Court further concludes that the defendants induced the infringement of claims 4-6 and 8-10.

D. Defendants' "Third Monomer" Noninfringement Defense Is Without Merit

Defendants argue that their adhesive products contain certain additional so-called "third monomers", which take them outside the scope of the claims in suit. These "third monomers" include acrylamide and two other compounds (which the Court will not identify, in order to preserve defendants' allegedly proprietary information). (Tr (Vanderhoff) 277-78; AX 580-81).

The defendants' argument focuses on the "consisting essentially of" language used in the introductory portion of claim 1. As discussed above, this expression precludes a finding of literal infringement only where a product contains additional, unrecited ingredients which, in nature and amount, change the basic and novel adhesive characteristics of the product. The Court finds, as the earlier discussion has shown, that the adhesive products made by defendants (E-200, E-216, E-220 and E-230), are basically and fundamentally the same as the product of claim 1. Consequently, the presence of the third monomers does not take the products outside the scope of the claims.

Defendants also raise a file wrapper estoppel argument. The expression "consisting essentially of" was added to claim 1 of the patent to exclude prior art compositions containing third monomers which in nature and amount change the basic and novel characteristics of the composition. (AX 2, pp. 121-23,

125-27; Tr (Witherspoon) 1077-80). This, defendants contend, creates a file wrapper estoppel which precludes a finding of infringement here. Initially, the Court notes that the doctrine of file wrapper estoppel has no application in this case since the Court has previously found that defendants' products literally infringe the claims in suit; file wrapper estoppel applies only where infringement depends on the doctrine of equivalents. *Graver Tank & Mfg. Co.,* 339 US at 607. In the interest of completeness, however, and because the Court alternatively finds that defendants' products infringe under the doctrine of equivalents, it has considered the file wrapper estoppel argument on its merits and finds that it does not excuse defendants' infringement of the '388 patent.

During prosecution of the application leading to the '388 patent, the Patent Office examiner rejected various then-pending claims on the basis of the plaintiff's earlier patents, particularly the '851 patent. (AX 2, pp. 110-13; Tr (Witherspoon) 1077-80). The product of the '851 patent, as discussed earlier, was an adhesive binder which was copolymerized in the presence of emulsifiers rather than PVOH; consequently, the '851 product did not have the inherent cross-linking which one obtains, according to the present invention, by using PVOH. The '851 patent employed a third monomer, specifically NMA, to provide cross-linking and improve the wet strength of non-woven fabrics treated with the binder. (TX 16, Col. 2, 11. 18-36; Col. 8, 11. 33-35; Tr (Vanderhoff) 2814; Tr (Gaylord) 1783).

In order to distinguish the claims here at issue from products of the '851 type, the phrase "consisting essentially of" was added. (AX 2, pp. 121-23, 125-27). The "consisting essentially of" language was the appropriate language to accomplish this narrowing because the '851 products are indeed basically and fundamentally different from the products here at issue; without the third monomers, the '851 product lacks cohesive strength. (TX 16, Col. 2, 11. 21-27; Tr (Vanderhoff)

440-43; Tr (Witherspoon) 1078-81, 1084-85; *see* Tr (Vanderhoff) 250-53; AX 794, 807-08).

Coming back to defendants' products here, however, they are not like the '851 product at all. They do not use third monomers to achieve cohesive strength; the third monomers used by defendants do not change the basic and fundamental character of the composition. (Tr (Vanderhoff) 311, 443; *see* Tr (Witherspoon) 1119). On the contrary, the infringing products, like the '388 product, are copolymerized in the presence of PVOH and have an inherent cross-linking giving rise to the insoluble fraction from that source alone. The third monomers have nothing to do with it. Indeed, the reason they were added to defendants' products in the first place was to provide this non-infringement argument. (AX 108, 122).

Moreover, the specific third monomers which defendants have added to some of their products are not cross-linking third monomers of the type used in the '851 patent. (Tr (Vanderhoff) 311, 443). The third monomers have been added in very small concentrations. (AX 875-78; Tr (Vanderhoff) 308-11, 325-27, 330-33, 337). These materials at these concentrations produce no change in the basic nature of the product. (Tr (Vanderhoff) 302, 304-07; *see* Tr (Vanderhoff) 308-11, 315-27, 329-40; AX 875-78; AX CC, EE, FF).

This Court's findings are reinforced by defendants' own conduct. All the "E series" products at issue here were considered by defendants not to have cross-linking capability through the action of third monomers. (Tr (Wacome) 462-64, 466-69; Tr (Myrick) 169-71; AX 83, 100, 122, 125, 221, 753 pp. 14-15).

Also, the E-200 product was admittedly manufactured from at least October 17, 1978 to at least January 16, 1979 without any acrylamide or other third monomer. (AX 768, p. 22; AX 769, p. 23). Later, acrylamide was reintroduced for a short period commencing in July 1979, but, because it caused manufacturing problems, it was replaced by another third

monomer in July or August 1979, all for the purpose of establishing a non-infringement argument. (AX 173, 185, 194; Paradowski Dep. 564, 620-27; Schwirian Dep. 442-43, 508-09, 518-20; Tr (Schwirian) 2063-65). Despite these changes in formulation, defendants considered all these products to be the same, and their advertising and advice to customers in no way indicated that any third monomer was present. (AX 142, 160, 222; Tr (Wacome) 464-65; Tr (Erikson) 106-07; Tr (Myrick) 165-66, 169-71; AX 753, pp. 3-10, 14-15; Tr (Donaldson) 181-83; AX 754, pp. 29-35).

Evaluations made by National Starch of E-200 and E-216 with and without the post-July or August 1979 third monomer dealt only with qualitative tests of machining properties for which there were no back-up records of actual observations. Those tests, at best, showed that E-216 is somewhat closer in performance to Airflex 400 and Elvace 1875 than is E-200. (TX 565, Production No. H30871; Tr (Nadler) 1670-80, 1688, 1691-95).

In addition, various data relating to the properties and formulations of defendants' E-200, E-216, E-220 and E-230 products were analyzed and evaluated at trial. (Tr (Vanderhoff) 275-82, 302-43; AX 220, 566-82, CC, EE, FF). These evaluations showed that there were no substantial differences in the properties of those emulsions with the additional third monomers as compared to those without them. (Tr (Vanderhoff) 302, 305-07, 315-16, 319-20, 325-27, 333-43).

Finally, in the face of all the above evidence that these third monomers make no difference in the accused products, defendants presented no evidence that they do. Indeed, during trial defendants were given the opportunity by the Court to update their discovery production to plaintiff and present testimony on this issue, but defendants elected not to do so. (Tr (Nadler) 1628-46; Tr (Battaglia) 1998-2008). The general rule is that where an accused infringer "fails to offer any technical or engineering evidence as to why a minor variation

from the literal language of the claim is of any significance, the Court can only assume that any such differences are colorable and were adopted by the defendant for patent purposes only." *Plasser American Corp.*, 546 F.Supp. at 604. The Court concludes that any changes made by defendants in their accused products were indeed made for patent purposes only.

E. Defendants' Argument That Other "Additives" Avoid Infringement Is Without Merit

Defendants in every case carried out their polymerization in the presence of PVOH, but at various times added other materials to the infringing products. The other additives were certain dispersing agents and emulsifiers (which, again, the Court will not identify in order to preserve defendants' allegedly proprietary information). (Tr (Vanderhoff) 277-78, 312). These materials were, when present, added in very small amounts (*see* AX 875-78) and their concentration is far below that which would be required to stabilize the emulsion. (Tr (Vanderhoff) 312). Rather these ingredients, like the numerous ingredients which an end-user of the E-200 product might add by a process known as "compounding," serve only to tailor the adhesive to a specific end use. Such compounding is contemplated by the '388 patent and the presence of such ingredients does not avoid infringement. (AX 1, Col. 15, 11. 43-47). Furthermore, the presence of these ingredients in the amounts shown had no substantial effect on the basic properties of the vinyl acetate-ethylene copolymer emulsion. (Tr (Vanderhoff) 302, 305-07, 312-15, 325, 329, 333, 337-39; AX CC, EE, FF).

That the "additives" included in defendants' products had no effect on the basic character of the composition is apparent from an analysis which compares the products having no additives to those which did. The results show no significant changes. (Tr (Vanderhoff) 315-24, 329, 333-43; AX CC, EE, FF). As in the case of the third monomers, defendants'

advertising never indicated that these additives, which were present at some times but not at others, had any effect on the properties of the product.

F. This Is An Exceptional Case Within The Meaning Of 35 USC § 285

From the very beginning of their program to market a product like Airflex 400, defendants' conduct evinced a blatant disregard for plaintiff's patent rights. Initially, defendants simply copied plaintiff's Example 8 product. Later, in a failed attempt to avoid the '388 patent, defendants added certain third monomers which, as stated above, were designed not to improve or change the product in any way, but rather to provide the basis for a legal argument that they had "circumvented" the '388 patent. (AX 108, 122; Tr (Wacome) 465-67; Tr (Ungefug) 513-17; Paradowski Dep. 569-72).

As the Court previously found, these third monomers did not materially change the nature of the product. If anything, the third monomers caused process problems and for a time had to be eliminated in order to maintain a commercial operation. (AX 122, 185, 194-95; Tr (Schwirian) 2063-65; Paradowski Dep. 623-25; Schwirian Dep. 511-14, 681-83; Plotkin Dep. 484-87, 533-35, 561; Tr (Wacome) 472-78).

That the defendants added these third monomers for patent purposes only is further supported by statements made in connection with the prosecution of a patent application, filed in the name of Martin K. Lindemann, which is directed to one of the defendants' products, E-200 (which, on occasion, has employed the third monomer, acrylamide). (AX 3, 3A). To secure allowance of that application, which issued as United States Patent No. 4,339,552, Mr. Devine signed a declaration supposedly comparing the adhesive properties of Airflex 400 with the claimed acrylamide-containing E-200. (AX 3, pp. 27-29 (Paper No. 5); Tr (Devine) 503-04). In fact, the data was taken from a *non*-acrylamide-containing E-200 product. (AX

194-95; Tr (Wacome) 476-78; Tr (Devine) 505, 506-08, 510). The declaration therefore was totally erroneous, and the results prove the identity of the adhesive properties of the products, not the alleged superiority of an E-200 containing acrylamide.

Mr. Devine's attempts to excuse the error because of CST's "internal confusion" concerning its evaluations of its own products (Tr (Devine) 504, 506-08) call into question the probity and accuracy of those evaluations on all CST products, particularly E-200, E-220 and E-230. (AX 161 p.135, 174, 179, 191).

Thus, the Court concludes that defendants never had a good faith belief that the '388 patent was invalid. Defendants' unsuccessful attempt to avoid infringement of the patent by adding certain third monomers (and other materials) to the infringing products lends strong support to this Court's conclusion that the defendants, in truth, believed the '388 patent was valid. While defendants at trial attempted to excuse their disregard for the '388 patent by claiming that they were acting under advice of patent counsel, no written opinion obtained by CST supporting such advice on the validity of the '388 patent was ever introduced into evidence. (*See* Tr (Lindemann) 1376-83).

Consequently, the Court finds this an exceptional case within the meaning of 35 USC § 285 and awards plaintiff its attorneys' fees.

G. The Court Concludes That Air Projects Is Entitled To An Injunction

In view of the foregoing findings and conclusions, the Court concludes that Air Products is entitled to an injunction against further infringement of the '388 patent for the remaining years of the patent's term.

District Court Order And Opinion, Including Findings Of Fact And Conclusions Of Law, Filed May 2, 1983

V. TRADE SECRETS

A. Introduction

The alleged trade secrets involved in this action relate to Air Products' commercial-scale production of vinyl acetate-ethylene copolymers, including but not limited to Airflex 400, the subject of the '388 patent. These alleged trade secrets were defined in detail in Appendix A to the Amended Complaint. This appendix, which had been required by this Court, served to enumerate and define all of Air Products' trade secrets which it alleged and believed had been misappropriated by defendants.

Appendix A set forth sixteen (16) separate alleged trade secrets. By the time of trial, discovery had reduced the trade secrets before the Court to those specifically set forth in Appendix A, part I; parts III(2) and (3); and parts IV(2) and (4).

Without revealing the alleged trade secrets themselves, the three items defined in Appendix A and before this court at trial were:

(1) The reaction control system used to control the reaction conditions during the copolymerization reaction (hereinafter referred to as "trade secret A-I," or the "A-I system"),

(2) The designs used in the reaction vessels themselves (hereinafter referred to as "trade secrets A-III (2) and (3)," or the "A-III (2) and (3) designs"), and

(3) Various process techniques for conducting the copolymerization reaction (hereinafter referred to as "trade secrets A-IV (2) and (4)").

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B. The Applicable Legal Standards

The burden of proving the existence of a trade secret and its misappropriation is on the plaintiff, Air Products. *Lowndes Products, Inc. v. Brower,* 259 S.C. 322, 177 USPQ 209 (S.C. 1972).

Trade secrets are defined by the American Law Institute's Restatement of Torts, § 757. *Klockner-Humboldt-Deutz Aktiengesellschaft Koln v. Hewitt-Robins,* 205 USPQ 257, 263 (D.S.C. 1978); *Wilkes v. Pioneer American Insurance Co.,* 383 F.Supp. 1135, 1139 (D.S.C. 1974). *See also Kewanee Oil Co. v. Bicron Corp.,* 416 U.S. 470, 474-75 (1974). This Court adopts the definition of trade secrets as given by the Restatement, § 757 comment b (1939):

> A trade secret may consist of any formula, pattern, device or compilation of information which is used in one's business and which gives ... [the owner of the trade secret] an opportunity to obtain an advantage over competitors who do not know or use it. It may be a formula for a chemical compound, [or] a process of manufacturing ...

Chemical processes, formulas, and related equipment are protectable trade secrets. *Colgate-Palmolive Co. v. Carter Products Inc.,* 230 F.2d 855, 865 (4th Cir. 1956); *E.I. duPont de Nemours & Co. v. Christopher,* 431 F.2d 1012, 1013-14 (5th Cir. 1970).

A trade secret must be secret, that is, it must not be generally known to the public. *Kewanee Oil Co.,* 416 U.S. at 475. Trade secrets can coexist with patent protection directed to the same general subject matter. *Colgate-Palmolive Co.,* 230 F.2d at 856-65. Trade secrets must also possess at least some measure of novelty. *Kewanee Oil Co.,* 416 U.S. at 475.

For misappropriation to be shown, Air Products was required to prove to this Court that competitively-valuable confidential and proprietary information was taken from Air Products or its predecessor Airco, and was in fact used by CST.

Without such a showing, no remediable misappropriation could have been shown to have taken place, and Air Products would not be entitled to any relief.

In view of the record in this case, this Court finds that Air Products has failed to sustain its burden of proof by a preponderance of the evidence on the trade secret issues.

C. The Reaction Control System

In commercially manufacturing the vinyl acetate-ethylene copolymer products under consideration in this case, the copolymerization reaction must be controlled by a "reaction control system" which regulates the reaction to assure proper operating conditions. (AX 881-82; Tr (Smith) 766-68, 769-73, 774-82; Tr (Uhl) 886-91, 897-900; Tr (Cordeiro) 660-61, 664-66). The system at issue was described in a document which became known in these proceedings as the "Plotkin memorandum," written in November 1968. (AX 441-42; Plotkin Dep. 1435-41, 1463-64, 1530-31).

Extensive testimony on the reaction control system was offered at trial. Considerable expert testimony was presented by both sides: Mr. Plotkin, Mr. Liptak, Dr. McAvoy, Dr. Smith and Dr. Cordeiro all testified on the subject. Not surprisingly, much of the testimony offered was irreconcilably conflicting.

Air Products' experts, Drs. Smith and Cordeiro, testified that the A-I system was unique and valuable to the present commercial operations of Air Products, particularly in permitting flexibility in manufacturing more than one product in a given reaction system. They testified that the system was unknown in the open literature, and would not have been obvious to the skilled chemical engineer specializing in reaction control systems. (Tr (Smith) 782, 792-93, 825; Tr (Cordeiro) 660-61, 669-73, 680-86; Cordeiro Dep. 364, 403-04, 407, 485-90, 492-98; *see* Tr (McAvoy) 2629-31, 2665-66, 2671-74, 2965-66; Tr (Plotkin) 2354, 2413).

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Defendants' experts, Mr. Plotkin and Dr. McAvoy, relying in part on patents and other publicly available literature, testified that the system was not unique, its essentials being old and available to the public. (TX 530, 589; AX 353; Tr (Plotkin) 2218-20; Plotkin Dep. 996-97, 1022-23; Tr (McAvoy) 2624-27; *see* Tr (Cordeiro) 691-96; Cordeiro Dep. 338-45). Dr. McAvoy, although admitting, in response to this Court's direct questions on the point, that he did not know of any other disclosure of the A-I system, testified that the components of the systems were old and known for the control of batch polymerization reactions such as the production of the '388 patent's vinyl acetate-ethylene copolymers. (Tr (McAvoy) 2629-31; TX 516-18, 530, 634-37; Tr (McAvoy) 2624 *et seq.*). He testified that the "essence" of the system could be found, for example, in a reaction control system illustrated by Mr. Liptak in Figure 10.1h of his book, *Instrument Engineer's Handbook*, which Mr. Plotkin confirmed in his testimony. (TX 518, 634; Tr (McAvoy) 2628-29, 2660-64, 2933-48; Tr (Plotkin) 2221, 2237-56). Mr. Liptak, testifying on behalf of the plaintiff, stated that the A-I system was not disclosed in that figure or in his book. (Tr (Liptak) 2745-46, 2751-71). Dr. McAvoy, on rebuttal, attacked Mr. Liptak's refutation of his earlier testimony. (Tr (McAvoy) 2942-45, 2950-52, 2955-60, 2964). Neither yielded in their respective positions either on cross-examination or in view of each other's testimony.

Dr. McAvoy also relied on a variety of other publicly available documents (patents and other literature) as disclosing the A-I system. (TX 516-18, 530, 634-37; Tr (McAvoy) 2624 *et seq;* 2655-56, 2659-60, 2665). Several of those systems, however, had earlier been discarded by Mr. Plotkin during his work at Airco. (TX 516-17; Tr (McAvoy) 2631-37, 2674-77). Both Dr. McAvoy and Mr. Plotkin also testified at some length concerning a variety of Dr. Smith's publications (TX 633, 636, 637) in an attempt to show that that literature contained the

elements of the A-I system. (Tr (McAvoy) 2645 *et seq.;* Tr (Plotkin) 2225-32).

The record shows that Mr. Plotkin, who was responsible more than anyone else at Airco for design and development of the control system described in his memorandum (AX 441-42), left Airco in 1968 and joined CST at the behest of his former co-worker Martin K. Lindemann, then CST's Vice President of Research and Development. (TX (Lindemann) 606-07, 1157, 1369-70; Tr (Plotkin) 2265, 2278-79). Mr. Plotkin headed up process engineering for CST and eventually designed and supervised installation of its Woodruff plant for the manufacture of vinyl acetate-ethylene emulsions, located in Enoree, South Carolina. (*See* Tr (Plotkin) 2264-65, 2403-04; Plotkin Dep. 58-60).

This Court notes that although Mr. Plotkin had certain obligations of confidentiality to Airco and its successor in interest of its emulsions business, Air Products, this is not an action against Mr. Plotkin personally for breach of any duty, express or implied.

The evidence adduced at trial indicated that Mr. Plotkin did install the various reaction control systems at CST, including those on the reaction systems used to produce vinyl acetate-ethylene copolymers. (AX 304, 307-08, 341, 344-45; Plotkin Dep. 122-24, 135-44, 182-225, 235-36, 239, 303-05, 453, 674-77; *see* AX 769). In doing so, however, Mr. Plotkin testified that he had used his experience and ordinary skill as a chemical engineer to design the control systems he installed, and that he had not misappropriated Air Products' confidential and proprietary trade secret information. (Tr (Plotkin) 2319, 2333, 2354, 2403-04). Mr. Plotkin further testified that the systems installed on various CST reactors were never used, particularly the system on the No. 12 atmospheric reactor. (AX 341, 344; Tr (Plotkin) 2355-61; Tr (Schwirian) 2042-43; Schwirian Dep. 199; *see* Plotkin Dep. 141, 145, 183-84, 248, 709).

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Although installed on CST reactors used for vinyl acetate-ethylene copolymerization reactions, the reaction control system designed by Mr. Plotkin did not work properly. In fact, problems with CST's products arose which were laid in part to the use of the system. This, in turn, led to extensive experimental work in late 1979-early 1980 which resulted in the manual operation of the reaction system. (*See* AX 173, 175; Tr (Schwirian) 2036-40; Schwirian Dep. 527 *et seq;* Paradowski Dep. 611-17, 665-86; Plotkin Dep. 514 *et seq;* 561). To prevent even accidental use of the control system, CST personnel subsequently physicially disabled it so that it could not be used. (Tr (Plotkin) 2358-59, 2363; Tr (Schwirian) 2039-42; Tr (McAvoy) 2619-20). The record indicates that CST's reaction control system certainly did not give rise to any competitive advantage to CST, and certainly did not provide the benefit or value which plaintiff derived from its reaction control system. (*Cf.* Tr (Cordeiro) 649-53, 705-07). Whatever Mr. Plotkin installed at CST, it apparently did not function in the same manner and with the same effectiveness as the Air Products' system which was allegedly misappropriated.

The reaction system that Mr. Plotkin installed was in many instances never used to produce any polymer product, let alone a vinyl acetate-ethylene copolymer. Where the system he installed was used, it apparently damaged CST's ability to produce copolymer products, rather than enhance its production capabilities or product quality. Mr. Plotkin's experiment with the Liptak Fig. 10.1h system confirmed that no enhanced value or unfair competitive advantage resulted from the use of the system he designed and installed at CST over other systems unarguably available to the skilled chemical engineer for use with the CST reaction system. (AX 905A-C; Tr (McAvoy) 2685-86, 2938-40, 2949-52; Tr (Plotkin) 2330-31, 2346, 2350).

Under these circumstances, this Court finds that plaintiff has not shown, by a preponderance of the evidence, that there has been a misappropriation of the alleged A-I trade secret by defendants.

Besides failing to prove misappropriation, plaintiff has failed to show that there is any relief to which it could be found to be entitled if a damage trial was held in this cause. The use of Mr. Plotkin's system has damaged CST, nor Air Products; Air Products cannot be relieved of or seek recompense for such acts, even assuming that it would want to from its own competitive viewpoint.

D. Reaction Vessel Configuration

The reaction vessel configuration embodying alleged trade secrets A-III (2) and (3) was the result of design activities undertaken at Airco beginning in mid-1963. (*See* Plotkin Dep. 1014-16, 1130-32). Mr. Plotkin was part of the design team which designed several generations of reaction vessels, culminating in the reactor design for the Aircoflex No. 1 reactor at Calvert City. (AX 365-67, 369-73, 376A, 379-81, 385, 389-91; Plotkin Dep. 1057-59, 1062-68, 1121-26, 1130-39, 1168-69, 1174-75, 1205 *et seq,* 1226-33). This reactor combined a particular internal heat exchange surface configuration with jacketing, constituting trade secrets A-III (2) and (3), in a pressure reactor for manufacture of vinyl acetate-ethylene copolymer emulsions.

Plaintiff's expert, Dr. Uhl, directed his testimony at trial to showing the wide variety of reaction vessel configuration alternatives available in designing a vinyl acetate-ethylene reaction vessel. (Tr (Uhl) 879 *et seq; see* AX 882-96). Dr. Uhl testified that the specific reaction vessel configuration of A-III (2) and (3) was not generally known for use in the manufacture of vinyl acetate-ethylene copolymer products. (Tr (Uhl) 939-40). He then presented a chart which purported to show a near identity between the Aircoflex No. 1 reactor and CST's 8,000 gallon EVA reactor, both having been designed by Mr. Plotkin and built by Nooter Corporation. (AX 898, 899; Tr (Uhl) 940-49, 1011-13, 1027-28; Plotkin Dep. 378-79, 470-71; Fernengel Dep. 262, 402, 404-05).

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Defendants' proofs, based primarily on Mr. Plotkin's testimony and various patents and other open literature publications, were directed to showing that the A-III (2) and (3) reaction vessel configurations were known generally to those skilled in chemical engineering and the design of reaction vessels, particularly the A-III (2) jacketing configuration. The use of these known configurations for a vinyl acetate-ethylene pressure reactor, defendants argued, is not the misappropriation of any proprietary information of plaintiff's but the mere application of good chemical engineering knowledge and experience on Mr. Plotkin's part, which he was not barred from using simply because he once worked for plaintiff's predecessor, Airco.

Defendants brought before this Court a variety of proofs showing the availability of these reaction vessel configurations in the chemical engineering arts. Mr. Plotkin testified that one of the CST reaction vessels he bought, the No. 10 vessel which employed the A-III (2) jacketing configuration, had been purchased from a used equipment vendor. (Tr (Plotkin) 2269-73). The open literature and manufacturer's brochures also show configurations similar to both the A-III (2) jacket configuration and the internal heat transfer surface configurations of the A-III (3) scheme. (TX 527, 546-48, 568-73, 575, 577; Tr (Plotkin) 2125-28, 2131-33, 2172-77, 2183-85, 2191-96, 2199-2203, 2292-92, 2307-14, 2391-96). Certain patents were also brought to this Court's attention which contained disclosures relevant to the A-III (2) and (3) configurations, particularly in batch polymerization reaction vessels. (TX 503-06, 601).

For example, TX 527, the Markovitz article entitled "Picking the Best Vessel Jacket," disclosed three main jacket configurations for use in polymerization reactors. When certain design constraints, cost constraints and even shipping restrictions applicable to the CST vinyl acetate-ethylene pressure reaction vessel were brought out by Mr. Plotkin, it became apparent from the Markovitz article that only the A-III (2)

configuration could be chosen by a skilled chemical engineer in designing the CST vessel. (Tr (Plotkin) 2183-96).

Furthermore, Mr. Plotkin testified, and Dr. Uhl admitted, that the jacketing configuration of A-III (2) had, at least by itself, been known for use in polymerization reaction vessels for years. (Tr (Plotkin) 2125-27; Tr (Uhl) 955-56; TX 503, 505). When Mr. Plotkin went to work for National Starch, he found that virtually every polymerization vessel that was in place at National Starch's vinyl acetate homopolymer and copolymer plants utilized the A-III (2) jacket configuration. (AX 452; TX 584 A-P; Plotkin Dep. 1566-74, 1576-87, 1608-13; Tr (Plotkin) 2316-18).

The open literature and patent art also contain examples of internal heat transfer surface configurations similar to the A-III (3) configuration. Dr. Uhl admitted that, at least by itself, the general internal heat transfer surface configuration of A-III (3) had been known for use in polymerization vessels for years. (Tr (Uhl) 955-56). Two United States patents, U.S. 3,049,413 (TX 504) and 2,875,027 (TX 506), although seemingly not explicitly directed to pressure reaction vessels (*see* Tr (Plotkin) 2389-90; Plotkin Dep. 351-52, 1575-77), disclose configurations comparable to the A-III (3) configuration. (Tr (Plotkin) 2131-32, 2139-41). Numerous literature publications, including brochures distributed by Brighton, disclosed internal heat transfer surface configurations for polymerization vessels similar to the A-III (3) configuration (TX 546-48, 568-73).

Dr. Uhl attempted to show that other heat transfer configurations could have been chosen in the design of a pressure reaction vessel to remove or add heat to the reactor contents, particularly an external heat exchanger. (Tr (Uhl) 919-21, 967-70; *see* AX 717, p. 92). Mr. Plotkin, however, testified that the skilled chemical engineer had fewer design choices than those enumerated by Dr. Uhl. (Tr (Plotkin) 2172-73, 2178-91, 2198-2200, 2290).

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Evidence was also brought out which showed that Airco, plaintiff's predecessor, disclosed the general reaction vessel configuration of A-III (2) and (3) to its vinyl acetate monomer customers in the early 1960's (*See* Tr (Plotkin) 2113-17, 2133-39). The "Wheeler" document (TX 561), relating to an atmospheric vinyl acetate homopolymerization system, disclosed the A-III (2) configuration. (Tr (Plotkin) 2113-17, 2377-78). The "Fernengel letter" (TX 537) was sent to Mr. Blakely, former president of CST, in 1964. It disclosed the general internal heat transfer surface configuration of A-III (3) to CST, as it described the system used in one of the earlier generation reaction vessel configurations which Mr. Plotkin had designed. (Tr (Plotkin) 2133-39, 2376-77).

On this record, this Court finds that Air Products failed to establish its case by a preponderance of the evidence. Since Air Products had the burden on the issue, the Court finds there was no misappropriation.

E. Reaction Process Techniques

Two reaction process techniques were alleged to be confidential and proprietary trade secret information of plaintiff which defendant CST had misappropriated, A-IV (2) and (4). The A-IV (4) technique was directed to the "finishing" of the vinyl acetate-ethylene copolymerization reaction, and incorporated the use of the A-I control system. As this Court has found that the A-I trade secret was not misappropriated, it follows that defendants could not have misappropriated the A-IV (4) finishing technique which uses that system.

The A-IV (2) item involves the initiation of a vinyl acetate-ethylene copolymerization reaction. The "initiating" technique was developed by Air Products after it purchased the Airco emulsions business in 1971, involving experiments that began in 1973 and were concluded in or about 1975. (AX 484-87; TX 541; Tr (Cordeiro) 711-13, 733-37; Tr (Schwirian) 2075-76). During this period, Mr. Schwirian was Air Product's

Manager of Process Development and Engineering and was apparently fully familiar with the technique and the experimental work leading thereto. (AX 485-92; Tr (Schwirian) 2026-28, 2075-76; Schwirian Dep. 27, 34-35, 357-58, 839-42, 845-65, 927-29).

Defendants' personnel testified at trial, and proffered documentary evidence, to the effect that the initiation technique was known to CST as early as 1969-70, when it was used by Mr. Wacome to produce other polymeric products. (Tr (Wacome) 2082-86, 2089-90, 2094; Tr (Schwirian) 2020-25, 2030-31, 2060-63; Schwirian Dep. 143-44, 352-53, 388-89, 946-50, 954-57). The documentary evidence, particularly a Rohm & Haas brochure, indicated that the technique was publicly disclosed for use in the preparation of other polymeric products. (TX 539; Tr (Wacome) 2088-89; *see* Schwirian Dep. 779-80, 784-85).

The record demonstrated that CST had acquired its knowledge of the initiation technique of A-IV (2) by some means other than through Mr. Schwirian, despite the fact that after he joined CST in July 1979 as its Corporate Engineer (thereafter Process Development Manager), CST adopted a new process procedure for E-200 and E-216 incorporating such a technique. (Tr (Schwirian) 2018-19, 2035-36; Schwirian Dep. 558-59; AX 218; Schwirian Dep. 349-51, 356-58, 368-73). Mr. Wacome had learned and used the technique prior to Mr. Schwirian's arrival at CST. (TX 509; Tr (Wacome) 2082-87). Both Mr. Wacome and Mr. Schwirian testified that adoption of the technique at CST was suggested by Mr. Cohen, a National Starch employee. (Tr (Schwirian) 2046-47).

This Court accordingly finds that Air Products has failed to carry its burden of proving that CST, irrespective of the trade secret status of the A-IV (2) technique, misappropriated or otherwise first learned of the technique through information taken from Air Products through the vehicle of Mr. Schwirian.

The technique was broadly known to the public and particularly to National Starch and Mr. Wacome, for use with other polymerization reactions. In fact, an Air Products patent, U.S. 4,332,850, issued May 26, 1982 (TX 600), discloses the A-IV (2) technique for vinyl acetate-ethylene polymerization, which, Air Products admits, therafter vitiated its alleged trade secret status. (*See* Tr (Schwirian) 2053a-55). The source of CST's knowledge appears, therefore, to be Mr. Wacome, and not Air Products through Mr. Schwirian. Consequently, no improper misappropriation has been proven to this Court of item A-IV (2).

F. Summary

Air Products has failed to prove by at least a preponderance of the evidence that CST and/or National Starch misappropriated the alleged trade secrets of items A-I, A-III (2), (3), and A-IV (2), (4) of Appendix A to the Amended Complaint. Defendants, therefore, are entitled to judgment on Count II of the Amended Complaint.

While the Court concludes that plaintiff has failed to carry its burden on the trade secret issues, the Court also finds that the plaintiff was not guilty of any bad faith in asserting this claim. The fact that the defendant CST hired four former key employees of the plaintiff or plaintiff's predecessor, Airco, coupled with the fact that defendants did manufacture infringing products which are virtually identical to plaintiff's commercial product, Airflex 400, justifies plaintiff's pursuit of the trade secret cause.

THEREFORE, it is ordered, adjudged and decreed:

a. That the defendants be and they are hereby enjoined from manufacturing, using or selling Dur-O-Set E-200, E-216, E-220 and/or E-230, or any other product embodying the invention claimed in the '388 patent-in-suit, and from otherwise infringing, or inducing others to in-

fringe, the patent-in-suit, all for the remaining term of the patent;

b. That plaintiff be awarded its damages for prior infringement, including interest, and for its reasonable attorneys' fees and costs of suit attributable to the patent issues. Upon application of the plaintiff, the cause shall be set for determination of the issue of the amount of plaintiff's damages and reasonable attorneys' fees in a subsequent trial of these issues to be set by this Court;

c. That judgment be entered for defendants with respect to the trade secret allegations set forth in Count II of plaintiff's Amended Complaint, each party to bear its own costs of suit attributable to the trade secret issues.

AND IT IS SO ORDERED.

G. ROSS ANDERSON, JR.

G. Ross Anderson, Jr., Judge
United States District Court

Anderson, S.C.
May 2, 1983

Court of Appeals Judgment,
Filed August 28, 1984

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

AIR PRODUCTS AND CHEMICALS, INC.,

Appellee,

v.

No. 83-1230
79-826-3

CHAS. S. TANNER CO. and NATIONAL STARCH & CHEMICAL CORP.,

Appellants.

JUDGMENT

On appeal from the US District Court of South Carolina (Greenville Div.) This cause having been heard and considered, it is ordered and adjudged: Affirmed.

DATED: June 29, 1984

Petition for rehearing, Denied, August 10, 1984, Suggestion for rehearing, Declined, August 10, 1984.

ISSUED AS A MANDATE: August 28, 1984
COSTS: Against, Appellants
PRINTING—$1339.25
TOTAL—$1339.25

Entered by Order of the Court

George E. Hutchinson, Clerk

DOROTHY I. MYERS

Chief Deputy Clerk

District Court Judgment, Filed May 12, 1983

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF SOUTH CAROLINA
GREENVILLE DIVISION

Air Products and Chemicals, Inc.,

Plaintiff.

vs.

Chas. S. Tanner Co. and National Starch and Chemical Corp.,

Defendants.

This action came on for trial before the Court on November 29, 1982. The issues were duly tried, and this Court thereafter entered its Order and Opinion, Including Findings of Fact and Conclusions of Law on May 3, 1983.

NOW, THEREFORE, IT IS ORDERED, ADJUDGED AND DECREED:

1. That the defendants be and they are hereby enjoined from manufacturing, using or selling Dur-O-Set E-200, E-216, E-220 and/or E-230, or any other product embodying the invention claimed in the '388 patent-in-suit, and from otherwise infringing, or inducing others to infringe, the patent-in-suit, all for the remaining term of the patent;

2. That plaintiff be awarded its damages for prior infringement, including interest, and for its reasonable attorneys' fees and costs of suit attributable to the patent issues. Upon application of the plaintiff, the cause shall be set for determination of the issue of the amount of plaintiff's damages and reasonable attorneys' fees in a subsequent trial of these issues to be set by this Court; and

3. That judgment be entered for defendants with respect to the trade secret allegations set forth in Count II of plaintiff's Amended Complaint, each party to bear its own costs of suit attributable to the trade secret issues.

AND IT IS SO ORDERED.

G. ROSS ANDERSON, JR.

G. Ross Anderson, Jr., Judge
United States District Court

Greenville, SC
May 12th 1983

District Court Order And Opinion Re Defendants' Motion Under Rules 59(e) and 60(b), F.R.Civ.P., For Alteration And/Or Relief From the Award Of Attorneys Fees, Filed June 14, 1983

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF SOUTH CAROLINA
GREENVILLE DIVISION

AIR PRODUCTS AND CHEMICALS, INC.

Plaintiff,

v.

Civil Action No. 79-826
Judge G. Ross Anderson, Jr.

CHAS. S. TANNER CO. and NATIONAL STARCH AND CHEMICAL CORP.,

Defendants.

ORDER AND OPINION RE DEFENDANTS' MOTION UNDER RULES 59(e) and 60(b), F.R.Civ.P., FOR ALTERATION AND/OR RELIEF FROM THE AWARD OF ATTORNEYS FEES

On May 24, 1983, defendants Chas. S. Tanner Co. and National Starch moved for alteration of the Court's Judgment entered May 12, 1983. The motion sought to delete, from both the Judgment and the Court's opinion of May 2, 1983, the Court's award to plaintiff of its attorneys' fees.

In support of their motion, defendants filed an affidavit of their trial counsel, and various exhibits. Both parties submitted briefs and the Court heard oral argument on June 8, 1983.

The basic ground asserted in support of defendants' motion is that defendants were surprised that the issue of liability for attorneys' fees, under 35 USC § 285, was being tried at the three week trial held in November and December 1982. If they had known, defendants argue, they would have put in evidence tending to show defendants had a good faith belief that the patent was invalid and not infringed. Defendants rely on the case of *Plasser American Corp.* v. *Canron, Inc.*, Civil Action

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No. 75-1932-5 (D.S.C. 1981) (unreported) as well as on other authorities relating to Rules 59 and 60, F.R.Civ.P.

The Court has fully considered defendants' affidavits, exhibits and arguments but finds that the defendants have not made the showing required by Rules 59 or 60 F.R.Civ.P. or by this Court's decision in *Plasser*. On the contrary, the record in this case, including the Court's order of December 21, 1981 in which the liability and damage issues were severed for separate trial, as well as the conduct of the parties at the trial itself, shows a full knowledge by all parties that all liability issues, including attorneys' fees, were being tried.

The Court's December 21, 1981 order separating the issues provides:

> 2. For the convenience of the parties and the Court, the trial of this action shall be severed, and the issues presented by the allegations of the Amended Complaint, the denials, affirmative defenses and counterclaims set forth in paragraph 1 through 57 of Defendants' Answer and Counterclaim, and the denials and defenses set forth in paragraphs 1 through 15 of Plaintiff's Reply, (with the exception of . . . damages on any claim or counterclaim) shall be tried together at a separate trial . . .

Thus, the only issues excepted were damage issues; all liability issues were set for the first trial.

That the attorneys' fees issue was expressly included in the liability trial is apparent from the amended complaint referred to in the aforesaid December 21, 1981 order. That complaint contained both plaintiff's claim to attorneys' fees and the allegation, specifically referred to in the order by referring to paragraph 9 of the Answer which denied the allegation that:

> [D]efendant's acts of infringement as alleged in aforesaid paragraphs 5, 6, 7 and 8 have been deliberate and willful . . .

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This separation of issues in the December 21, 1981 Order is in full accord with the orderly administration of justice. All the liability issues have been determined and can be reviewed on appeal, thereby leaving only an accounting of the amount of Air Products' damages and attorneys' fees. The severance of liability and damage issues in patent cases is in full accord with the intent of Rule 42(b) F.R.Civ.P. in that it is "conducive to expedition and economy." Such separation allows the Court the opportunity, where appropriate, to employ a special master (Rule 53, F.R.Civ.P.) or magistrate (28 USC § 636) to aid in the damages determination.

Further, evidence that defendants were not "surprised" is apparent from the trial itself. The Court's award of attorneys' fees to plaintiff was based on the Court's view of the totality of circumstances developed at trial; in particular, as reflected in the Court's Opinion of May 2, 1983, the Court relied upon the deliberate and willful nature of defendants' infringement as evidenced by defendants' blatant copying of plaintiff's product (Opinion at 82-83). The Court also relied upon defendants' lack of a good faith belief that the patent-in-suit was invalid (Opinion at 84). These findings, in the context of the case, fully support the award of attorneys' fees. *See Esco Corp.* v. *Tru-Rol Co.*, 352 F.Supp. 416, 427 (D.Md. 1972), *aff'd*, 489 F.2d 699 (4th Cir. 1974).

The evidence introduced at trial which supports the Court's findings is largely the testimony of defendants' own employees or former employees. Thus, it is difficult for the Court to find that defendants did not know the issue was before the Court when their own witnesses were examined at trial or their depositions offered in evidence. Certainly there was never any objection to the admissibility of this evidence.

In addition, defendants attempted to introduce at trial a number of documents bearing precisely on these issues. The documents had not earlier been produced to plaintiff; prior to

trial defendant contended the documents were immune from production because they were protected by the attorney-client privilege. At trial, however, defendants' counsel argued to the Court that he wanted to introduce them for the following reasons:

> I simply want to show that this gentlemen and the Charles S. Tanner Company acted in good faith on advice of counsel after serious deliberation. . . . That there is no willful or wanton infringement here. And that this man is not guilty of any willful or wanton infringement, and neither is the Charles Tanner Company.

Trial Tr. 1378. That argument evidences a clear knowledge that the issues were being tried.

The Court ruled the documents out because they had never been produced during discovery, but the Court allowed defendants' counsel to proceed with the examination of the witness on the willful and wanton infringement issue. In fact the Court specifically asked if the evidence was being offered "on the issue of willful violation" (Trial Tr. 1383). The defendants' counsel responded: "To demonstrate that we did not willfully and wantonly infringe." *(Id)*. The Court then said:

> BY THE COURT:
>
> And I'll permit it on that issue. A very narrow issue.
>
> COUNSEL FOR DEFENDANT.
>
> I understand, your Honor.
>
> BY THE COURT:
>
> Does anybody need the issue redefined for the record?
>
> (No Response)

Trial Tr. 1383.

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Still another fact which is inconsistent with defendants' claimed surprise is defendants' argument at the post-trial hearing of May 12, 1983 on defendants' motion for a stay of the injunction and for entry of judgment, the very same judgment here at issue. At that hearing, the present form of judgment—including the attorneys' fees award—was agreed upon. Not one word was said about defendants' present contention of surprise. At that hearing, defendants' counsel himself argued that he had put in, or tried to put in, at trial substantial evidence on defendants' good faith:

> . . . Plaintiff takes the position that really the court shouldn't pay very much attention to a motion being brought by the defendants here because the defendants were not in good faith and they are willful, wanton infringers . . . I would like to say a few words about that.
>
> Tanner had obtained an opinion and you allowed Mr. Lindemann to testify on the record from about pages 1376 to about 1387 what he did first was on the advice of counsel. . . .
>
> All I would like to say on that score, your honor, is I believe that my client was operating in a good faith manner, with good faith belief as to the invalidity of the patent . . .

Transcript of May 12, 1983 Hearing, pages 3-4.

After the argument, the form of judgment was agreed upon, signed by the Court and entered by the Clerk.

The showing required for a motion of the kind here made is well stated in *Federal Practice and Procedure,* Wright and Miller, Vol. 11 § 2858 at pp. 170-171:

> A party cannot have relief under Rule 60(b) (1) merely because he is unhappy with the judgment. Instead he must make some showing of why he was justified in failing to avoid mistake or inadvertence. Gross carelessness is not

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enough. Ignorance of the rules is not enough, nor is ignorance of the law. Voluntary action by a party may estop him from seeking relief on the ground of mistake or excusable neglect.

Defendants have not made the required showing.

The Court therefore denies defendants' motion as not being supported by the showing required by Rules 59 or 60, F.R.Civ.P.

And it is so ordered.

s/

G. Ross Anderson, Jr., Judge

Greenville, South Carolina
June 14, 1983

Stipulated Order, Filed December 21, 1981

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF SOUTH CAROLINA
GREENVILLE DIVISION

AIR PRODUCTS AND CHEMICALS, INC.,

Plaintiff,

vs.

STIPULATED ORDER
C.A. No. 79-826

CHAS. S. TANNER CO. and NATIONAL STARCH AND CHEMICAL CORPORATION,

Defendants.

IT IS STIPULATED by the parties, through their respective counsel, subject to the approval of the Court, that:

1. Plaintiff's Motion for a Separate Trial and a Stay of Discovery on the Antitrust and Patent Misuse issues is hereby withdrawn;

2. For the convenience of the parties and the Court, the trial of this action shall be severed, and the issues presented by the allegations of the Amended Complaint, the denials, affirmative defenses and counterclaims set forth in paragraphs 1 through 57 of Defendants' Answer and Counterclaim, and the denials and defenses set forth in paragraphs 1 through 15 of Plaintiff's Reply, (with the exception of any issues relating to any alleged patent misuse, restraint of trade, and/or violation of the antitrust laws, and damages on any claim or counterclaim) shall be tried together at a separate trial (hereinafter referred to as the "FIRST TRIAL") which shall be held in advance of the trial of the remaining issues.

3. Upon completion of discovery concerning the non-excepted issues set forth in paragraph 2 above, the FIRST TRIAL shall be held before this Court; the trial of all issues, including damages on any claim or counterclaim, which are not disposed of in the aforesaid FIRST TRIAL shall be held thereafter before this Court, at such time as this Court may fix upon further application after final determination of the afore-

said non-exempted issues and completion of appropriate discovery;

4. Except as provided in paragraph 5 below, pending a final determination of the non-excepted issues set forth in paragraph 2 hereof, the parties may conduct discovery limited to such non-exempted issues, but specifically excluding matters pertaining solely to the following subjects or allegations: relevant markets or submarkets; market share; possibility that plaintiff could have monopolized one or more relevant markets or submarkets; plaintiff's intent to monopolize one or more relevant markets or submarkets; reduction of competition in one or more relevant markets or submarkets; defendants' damages caused by plaintiff's violations of the Antitrust Laws; plaintiff's attempted or actual misuse of the patent in suit; plaintiff's damages resulting from defendants' infringement of the patent in suit; plaintiff's damages resulting from defendants' misappropriation of plaintiff's trade secrets; and plaintiff's unfair competition including defendants' damages resulting therefrom.

5. Without regard to the foregoing restrictions on discovery, this stipulated order does not restrict the parties from obtaining certain further discovery, prior to the FIRST TRIAL, of documents only, as defined by Rule 34, Fed. R. Civ. P., from one another or third parties limited to the following areas:

A. Documents relating to licenses, negotiations for same or other dealings or communications relating or referring to the patent in suit, its scope, validity, enforceability and/or infringement, and

B. Documents which satisfy each and every one of the following four conditions:

(1) they are found in the files of a party's, or a third party's, organizational group corresponding to (a) patents and licensing; (b) home office management in the areas of marketing or sales; or (c) in the case of third parties only, the legal department, *and*

(2) they mention vinyl acetate-ethylene emulsions, the patent in suit, or the adhesives claimed therein, *and*

(3) they mention any one or more of the following companies: (a) Air Products and Chemicals, Inc. or any of its predecessor companies (in the case of Air Products and Chemicals, Inc., such documents need not be produced under this paragraph 5); (b) Chas. S. Tanner Co., National Starch and Chemical Corporation, or Ciba-Geigy Corporation; (c) E. I. du Pont de Nemours & Company; (d) Hercules Incorporated; (e) Wacker G.m.b.H. or (f) Amsco Corporation, *and*

(4) they are otherwise discoverable under the Federal Rules of Civil Procedure considered in conjunction with the Plaintiff's Amended Complaint, Defendants' Answer and Counterclaim, and Plaintiff's Reply;

Provided however, (a) that nothing in this paragraph 5 shall be construed to enlarge the scope of document discovery beyond that permitted by the Federal Rules of Civil Procedure as applied to the Plaintiff's Amended Complaint, Defendants' Answer and Counterclaim, and Plaintiff's Reply, and that neither party nor any third party waives any objection to discovery by the other party on any ground available under the Federal Rules of Civil Procedure;

(b) that document discovery under this paragraph 5 shall not interfere with the orderly conduct of the discovery necessary for the FIRST TRIAL; and

(c) that defendants will in no way use or rely upon document discovery to be conducted under this paragraph 5 to delay, impede, or hinder Plaintiff's ability to conclude its

discovery and schedule and go forward with the conduct of the FIRST TRIAL.

SO ORDERED:

December , 1981 _____

United States District Judge

AIR PRODUCTS AND CHEMICALS, INC.

By: _____

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Attorneys for Defendants

Excerpts from Trial Transcript

Page 19, line 10 through page 20, line 23:

BY MR. FLINTOFT:

One would hope he would, but maybe he won't. Secondly, I noted yesterday that—I understand it's the practice here for each side to submit their own pretrial briefs to the Court without submitting it to the other side and I have no quarrel with that. But I also noted that the plaintiff submitted some sort of a trial outline to Your Honor and I have been trying for quite some time to figure out the schedule and witnesses and one thing or another. Now, if this outline that Mr. Roper has submitted to Your Honor sets forth the witnesses and what they're going to testify on and how long they're going to testify and things like that, I would really like to see it; and think I'm entitled to it.

BY THE COURT:

Thank you very much, but I don't really pay much attention to what either side says they're going to do.

BY MR. FLINTOFT:

Well, it would just help me get my witnesses down here in timely fashion.

BY THE COURT:

I require each of you, the night before, to give the other a list of witnesses you're going to use the following day.

BY MR. FLINTOFT:

Mr. Roper and I have no quarrel on that, Your Honor. You may realize—I believe it's already been submitted to Your Honor—we have entered into a stipulation which we think will aid in the admissibility of documents into evidence and, also, with respect to the witnesses. And we have agreed to give one another, to the extent that's it's practical and possible, either who is going to appear over the next two days, or a list of the witnesses that we think will probably appear over the next two days. And I think that certainly will help both of us run the case as efficiently as we can.

Excerpts from Trial Transcript

Page 1383, line 1 through line 17:

BY THE COURT:

Offering them on the issue of willful violation.

BY MR. FLINTOFT:

To demonstrate that we did not willfully and wantonly infringe.

BY THE COURT:

All right, I am ruling them out and you may ask him did he act on legal advice of counsel in doing whatever he did, whose lawyer was he, who paid him, who was he working for?

BY MR. FLINTOFT:

Yes, Your Honor, I understand.

BY THE COURT:

And I'll permit it on that issue, a very narrow issue.

BY MR. FLINTOFT:

I understand, Your Honor.

Excerpts from Trial Transcript

Page 3002, line 17 through page 3004, line 4:

BY MR. FLINTOFT:

Your Honor, should those proposed findings and conclusions be served on one another?

BY THE COURT:

No. No proposed findings. You don't get the benefit of his, he doesn't get the benefit of yours.

BY MR. FLINTOFT:

The reason I asked was I was surprised by the rule with respect to the pretrial briefs, and I just thought I should ask on this as well. So it's just submitted to the Court, then?

BY THE COURT:

Why does that surprise you?

BY MR. FLINTOFT:

Well, in most of the jurisdictions that I've appeared, you exchange pretrial briefs.

BY THE COURT:

And you know what that does to them?

BY MR. FLINTOFT:

Excuse me, Your Honor?

BY THE COURT:

Do you know what that does to a trial brief? Renders it totally useless if you let the other lawyers see—we have an absolute policy among federal judiciary in this state. Nobody except the law clerk sees your trial brief, nobody. They aren't even filed. They are just marked for the Court. The clerk's office doesn't even see them. We found that if you trade trial briefs, you have a tendency to overstate, gloss over and omit. If nobody sees it, you can be somewhat forthright. That's been our experience, and, quite frankly, I think, if it were left up to me I would abolish the trial brief. All I think they are is to make lawyers put in extra work. I'm not a believer in trial briefs. Any other matters we've got to cover?

Constitutional Provision,
Rules and Canon Involved

ORDER RE: CIVIL CASES SET FOR TRIAL IN SPECIAL OR REGULAR TERMS OF COURT IN THE DISTRICT OF SOUTH CAROLINA (D.S.C. July 7, 1964) reads as follows:

"In view of the large number of civil cases pending in the District, and in view of the fact that several special terms of civil court have been set, and in order to expedite the trial of such cases, all attorneys having civil cases set for trial at any special or regular terms of court are hereby directed to furnish to the Court a trial brief at least five (5) days prior to the opening of the term of Court in which such case is set for trial—which said trial brief shall include the following:

"1. Name of the attorney or member of the firm handling the case.

"2. Are there any Motions not already disposed of?

"3. Has all discovery been completed?

"4. Give names of witnesses, if any, whose oral depositions have been taken. Have these instruments been filed with the Court?

"5. Have any interrogatories or requests for admissions been served in this case? If so, give the dates of the interrogatories and the request for admission and the dates of the answers thereto. Have these interrogatories been filed with the Court?

"6. A concise statement of the issues involved in the case.

"7. A brief and concise statement of the facts upon which the claim or defense is based.

Constitutional Provision,
Rules and Canon Involved

"8. Legal authorities, State and/or Federal statutes, Regulations of State and/or Federal regulatory bodies, foreign laws, conflict of law, questions and conclusions of law upon which the claim or defense is based.

"9. Any unusual questions of law concerning admission of evidence or procedure likely to arise in the trial of the case.

"10. List of all exhibits intended to be used upon the trial of the case.

"11. List of names and addresses of all witnesses now known, together with a brief statement as to what you propose to establish by the testimony of each witness.

"12. In a negligence case also furnish the following:

"(a) Where permanent injuries are claimed, their nature must be described with particularity and plaintiff's life expectancy. Attach copies of medical reports and doctors' statements where available.

"(b) Special damages claimed must be specified in detail, thus in personal injury cases, medical, nursing, hospital and similar expenses should be itemized by giving the names of persons and institutions, and the amount paid to or owing each. If property damage is claimed, the cost of repairs and names of persons making them; or, if incapable of repair, the value of the property immediately before the accident and immediately afterwards.

"(c) If loss of earnings is claimed, the amount should be stated, the manner of computation, the period for which loss is claimed, and name of employer.

"(d) In death cases, the age, employment, return of earnings, marital status and life expectancy of deceased; also, the names, ages, and relationship of the dependents, together with the amount of contributions made to them by the deceased for a reasonable period prior to deceased's death.

"(e) Plaintiff's counsel should prepare and submit a plat of the scene of the accident to opposing counsel for approval prior to the trial of the case.

"13. In a contract case:

"(a) If the contract is in writing, a copy should be furnished the Court, and the portions in controversy particularized, with a statement as to the claimed construction thereof, and performance or non-performance thereof, or obligation in connection therewith.

"(b) If the contract is oral, its substance should be given; and where there is a dispute of its terms, the controverted items specified and the same features covered as above mentioned as to written contracts.

"14. The Court should be advised as to the correctness of identity of legal entities and whether party is correctly designated as partnership, corporation, or individual doing business under trade name.

"15. Have you discussed and explored with opposing counsel the possibility of a compromise settlement?

"16. Do you know of any reason why the case cannot be tried at the term for which it is set for trial?

"(It is understood that the information required herein is for the sole use of the Court, and it is not expected that copies will be furnished to opposing counsel.)

"July 7, 1964."

The Fifth Amendment of the United States Constitution reads as follows:

"No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in actual

service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation."

Rule 16(c) of the Federal Rules of Civil Procedure reads as follows:

"(c) Subjects to be Discussed at Pretrial Conferences. The participants at any conference under this rule may consider and take action with respect to

"(1) the formulation and simplification of the issues, including the elimination of frivolous claims or defenses;

"(2) the necessity or desirability of amendments to the pleadings;

"(3) the possibility of obtaining admissions of fact and of documents which will avoid unnecessary proof, stipulations regarding the authenticity of documents, and advance rulings from the court on the admissibility of evidence;

"(4) the avoidance of unnecessary proof and of cumulative evidence;

"(5) the identification of witnesses and documents, the need and schedule for filing and exchanging pretrial briefs, and the date or dates for further conferences and for trial;

"(6) the advisability of referring matters to a magistrate or master;

"(7) the possibility of settlement or the use of extrajudical procedures to resolve the dispute;

"(8) the form and substance of the pretrial order;

"(9) the disposition of pending motions;

"(10) the need for adopting special procedures for managing potentially difficult or protracted actions that may involve complex issues, multiple parties, difficult legal questions, or unusual proof problems; and

"(11) such other matters as may aid in the disposition of the action.

"At least one of the attorneys for each party participating in any conference before trial shall have authority to enter into stipulations and to make admissions regarding all matters that the participants may reasonably anticipate may be discussed."

Rule 16(e) of the Federal Rules of Civil Procedure reads as follows:

"Pretrial Orders. After any conference held pursuant to this rule, an order shall be entered reciting the action taken. This order shall control the subsequent course of the action unless modified by a subsequent order. The order following a final pretrial conference shall be modified only to prevent manifest injustice."

Rule 52(a) of the Federal Rules of Civil Procedure reads as follows:

"Effect. In all actions tried upon the facts without a jury or with an advisory jury, the court shall find the facts specially and state separately its conclusions of law thereon, and judgment shall be entered pursuant to Rule 58; and in granting or refusing interlocutory injunctions the court shall similarly set forth the findings of fact and conclusions of law which constitute the grounds of its action. Requests for findings are not necessary for purposes of review. Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to

the opportunity of the trial court to judge of the credibility of the witnesses. The findings of a master, to the extent that the court adopts them, shall be considered as the findings of the court. It will be sufficient if the findings of fact and conclusions of law are stated orally and recorded in open court following the close of the evidence or appear in an opinion or memorandum of decision filed by the court. Findings of fact and conclusions of law are unnecessary on decisions of motions under Rules 12 or 56 or any other motion except as provided in Rule 41(b)."

Canon 3, A(4) of the Code of Judicial Conduct reads as follows:

"A judge should accord to every person who is legally interested in a proceeding, or his lawyer, full right to be heard according to law, and, except as authorized by law, neither initiate nor consider *ex parte* or other communications concerning a pending or impending proceeding. A judge, however, may obtain the advice of a disinterested expert on the law applicable to a proceeding before him if he gives notice to the parties of the person consulted and the substance of the advice, and affords the parties reasonable opportunity to respond."